# American Rescue Plan & COVID-19 Response Update

## Updated December 6, 2021

## FACTS

**$253,836,916**
**ARP Research Recovery Funds Mobilized**

**833 Awards Funded**

# OVERVIEW

As part of the national effort to recover from the COVID-19 pandemic, the National Science Foundation (NSF) continues to fund important research as well as recovery efforts to help the United States science, engineering and STEM education communities rebound. From equipment delays and reagent shortages to lost training time and missed field research, the pandemic has strained research projects in unique ways. With the continued support from Congress and the Administration, including the $600 million provided in the American Rescue Plan, NSF is able to support groups of individuals and institutions most strongly affected by the pandemic as well as those at vulnerable transition points in their research careers.

The funds are being invested consistent with the below guiding principles:

**MOST STRONGLY AFFECTED GROUPS.** The pandemic has exacerbated existing disparities and has had disproportionate impacts on specific groups of individuals. These strongly affected groups include:
- Women researchers, who have disproportionally taken on the duties associated with increased child-care and other family-related responsibilities.
- Underrepresented groups. Programs that support these students and researchers have been subject to disruption due to the pandemic.
- Early-career faculty. The early part of a research career represents a critical time for research productivity, building and funding a research program, and preparing for potential tenure and promotion.

**INDIVIDUALS AT VULNERABLE CAREER TRANSITION POINTS.** It is well established that attrition from STEM or higher education altogether frequently occurs at certain educational and career transition points, and the pandemic has intensified this threat. These individuals/transition points include:
- Undergraduates preparing to finish their degrees and attend graduate school.
- Graduate students, particularly those nearing the end of their research careers.
- Postdoctoral fellows, research trainees, and graduate fellows.
- Early career faculty.
- Mid-career faculty, who are often called upon to do greater service in light of pandemic impacts.

**BROAD DISTRIBUTION.** To ensure a broad distribution of funding and in further pursuit of the funds reaching those most impacted by the pandemic, NSF is using these funds towards an expansive research portfolio that prioritizes disproportionately affected persons at every institution as well as all persons at disproportionately affected institutions, such as:
- Minority-serving and less-affluent institutions, which may lack strong research administration infrastructure or the financial resources to support STEM students and faculty.
- Institutions in EPSCoR jurisdictions, which have not benefited from robust federal funding yet support a significant number of STEM students and faculty across the nation.

# AWARDS

| | American Rescue Plan funds | Research Recovery (FY21 + FY22) | COVID-19 Research (CARES Act + FY20 + FY21 + FY22) |
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| **Number of Awards** | 833 | 2,526 | 1,270 |
| **Funding Deployed** | $253,836,916 | $575,622,465 | $237,920,797 |
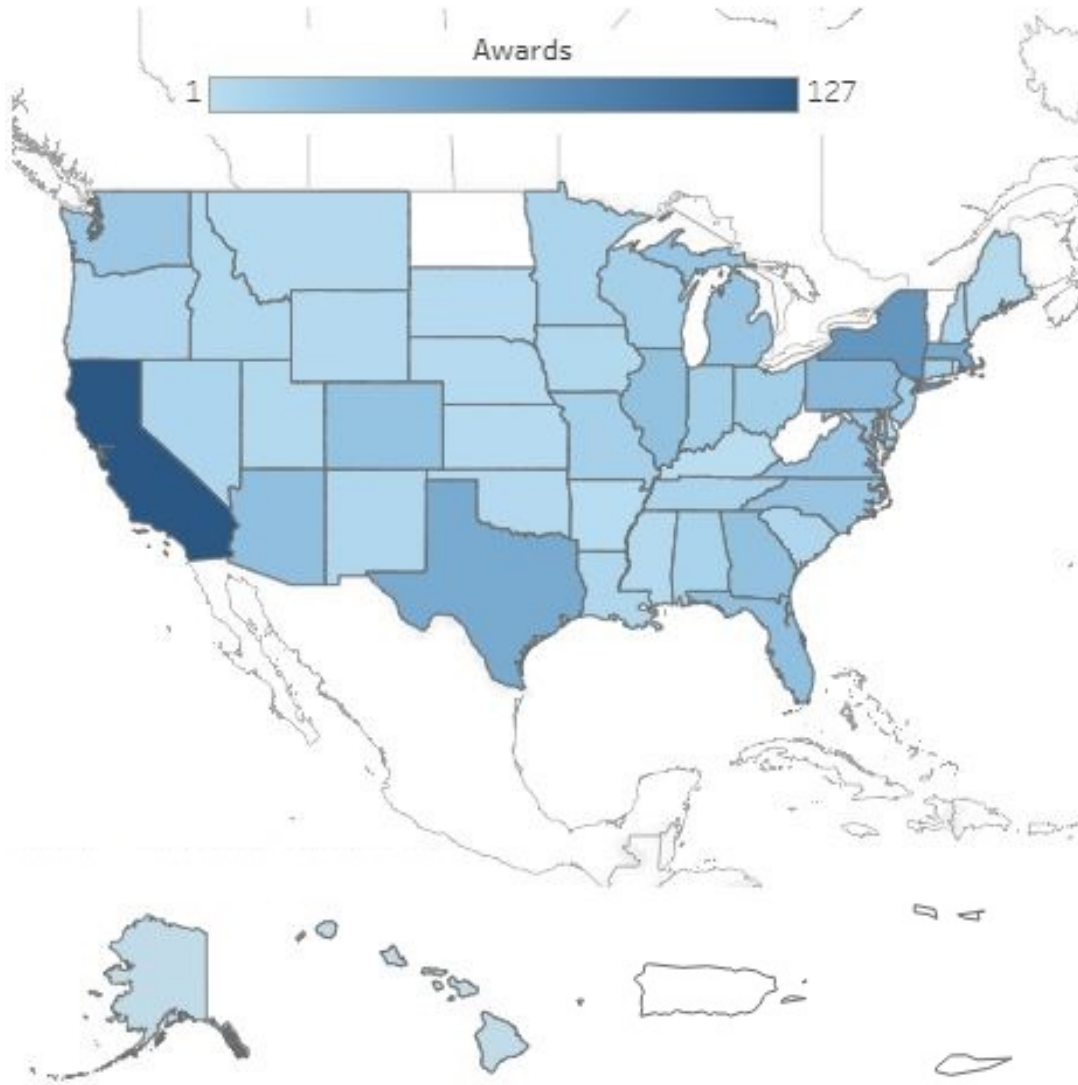


*ARP awards by state*

# NSF Support

This update spotlights [recent awards funded by the American Rescue Plan](#) and research programs stood up by NSF to support the scientific research community. It is a snapshot of the essential research and support NSF is able to invest in thanks to the support from Congress and the Administration.

## NSF PROGRAM FEATURE

### EPSCoR Program Provides Supplemental Funding to Support Researchers at MSIs
### FY2021 Funds

The COVID-19 pandemic has posed some specific challenges to the research community, challenges that are disproportionately affecting some individuals and institutions. NSF plays a vital role in supporting undergraduate students, graduate students, postdoctoral researchers, and early career faculty in STEM in the U.S. Support for individuals in these groups, as well as institutions that serve members of historically underrepresented groups, remains essential as the nation seeks to recover from the pandemic.

NSF's Established Program to Stimulate Competitive Research (EPSCoR) has provided almost $10M in supplemental support to 19 existing RII Track-2 awards to support individuals and institutions that are adversely affected by the COVID-19 pandemic. These supplements are focused on bolstering EPSCoR's Research Infrastructure Improvement (RII) [Track-2](#) networks by supporting researchers at minority-serving institutions (MSIs). A total of 32 supplemental funding awards ranging from approximately $200k - $600k were provided to facilitate MSI partnerships and fund postdoctoral fellowships for individuals at MSIs.

These supplements will:
- Broaden participation in RII Track-2 awards by creating opportunities for the development of partnerships that are bi-directional and mutually beneficial to better integrate MSIs into the research networks that have been developed through the RII Track-2 program;
- Engage new perspectives and scientific talent into the current RII Track-2 projects;
- Provide faculty at MSIs with opportunities to become involved in these networks, with a special focus on early career faculty; and
- Continue to support the EPSCoR mission of broadening participation in STEM fields.

# AWARD HIGHLIGHTS

## DIVISION OF ATMOSPHERIC AND GEOSPACE SCIENCES
### American Rescue Plan $349,440

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| **Title** | [MRI: Acquisition of Instrumentation for Real-Time Molecular Level Measurement of Atmospheric Gas- and Particle-Phase Compounds](#) |
| **Institution** | University of Alabama; Huntsville, AL |
| **Research & Recovery** | This project supports the acquisition of a compact, field-deployable mass spectrometer—a tool to determine the makeup of elements and isotopes in compounds in real-time. This specialized model is currently the only commercially available instrument that has the unique capability to detect various organic and inorganic compounds from gas- and particle-phases with high mass-resolution in real-time, and prior to this award, only one was available in the southeastern United States. |

This instrument will enhance research and educational programs in atmospheric and climate sciences at four shared-user institutions: the University of Alabama in Huntsville, University of Delaware, University of Georgia, and University of Iowa. This shared-user paradigm will enable multiple institutions to access the cutting-edge mass spectrometer in an extremely cost-effective way. The instrument will be rotated among five research projects in atmospheric chemistry, aerosols, clouds, air quality, and climate.  It will enable hands-on learning of mass spectrometry for graduate, and undergraduate students, including women and underrepresented members in STEM.

## DIVISION OF CHEMISTRY
### American Rescue Plan $248,613

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| **Title** | [LEAPS-MPS: Artificial Intelligence Techniques for Automatic NMR Metabolomics Data Processing](#) |
| **Institution** | North Carolina Agricultural and Technical State University; Greensboro, NC |
| **Research & Recovery** | This project will enable researchers and students to develop tools to analyze chemical data more easily for non-specialists. The data are related to environmental and health studies and will be obtained using Nuclear Magnetic Resonance methods. The novel way of data processing will use artificial intelligence (AI) methods. This research could have significant impacts on health monitoring by providing fast analysis of complicated data sets. This project hopes to broaden participation in STEM by underrepresented minority students by introducing them to applied data science and AI methods, making them more job-ready upon graduation. Opportunities for independent |

interdisciplinary research projects will be provided and a new course will also be developed.

This award provides research support to an early-career faculty member at an HBCU, and it will train students who are mostly Black or African American in highly desirable job skills in artificial intelligence, while also providing a strong scientific research background and financial support to allow these students from groups strongly impacted by the pandemic to pursue this professional training.


## OFFICE OF INTERNATIONAL SCIENCE AND ENGINEERING
### American Rescue Plan $166,147

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| **Title** | PIRE: Building Extreme Weather Resiliency and Global Community Resiliency Through Improved Weather and Climate Prediction and Emergency Response Strategies |
| **Institution** | State University of New York at Albany; Albany, NY |

**Research & Recovery**

Extreme weather resiliency demands improved weather and climate prediction and response strategies to strengthen the protection of life and property. The US-Taiwan PIRE team strives to address the following challenges: (1) better quantify trends in weather extremes on a regional scale (particularly in East Asia and the northeastern United States) through in-depth investigations of past extreme events and influences from large-scale global circulation patterns and changes in local environmental conditions; (2) examine new techniques for providing probabilistic numerical weather guidance on a regional scale; and (3) investigate the efficacy of decision-making by emergency managers informed with and without probabilistic weather forecasts and community impact information during extreme weather events. This partnership prepares a cadre of US-Taiwanese atmospheric and social scientists and practitioners with disciplinary and interdisciplinary academic and research experiences geared around extreme weather and resiliency.

The COVID-19 pandemic caused the closure of the university and restrictions on international travel which impacted research progress for three female graduate students at SUNY at Albany. This ARP supplement award will support these students, allowing them to complete their research program and publish their work.

**DIVISION OF RESEARCH ON LEARNING IN FORMAL AND INFORMAL SETTINGS**
**American Rescue Plan $915,455**

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| **Title** | Collaborative Research: Creating a Mechanism for Youth to Document Out-Of-School-Time STEM Learning as a Means for Expanding Educational Pathways |
| **Institution** | Regents of The University of Michigan; Ann Arbor, MI |

**Research & Recovery**

This project will create the specification for a learner-controlled system to represent youth learning in Out-of-School-Time (OST) settings, to improve access to future STEMlearning opportunities. For learners to pursue a STEM education, and STEM careers, they must be able to move through "gatekeeping" mechanisms that filter and sort student data based on factors such as prior coursework and grades, teacher recommendations, and language proficiency assessments. Even though abundant evidence shows that such measures fail to capture all important aspects of STEM learning, they are traditionally relied upon in secondary and post-secondary STEM education contexts as indicators of preparation for future STEM learning. This Innovations in Development project brings together youth from underrepresented youth in STEM and their families, OST providers, and admissions officials from higher education institutions to explore the needed design features for OST "transcripts" and user stories that describe how software systems can support their creation and sharing. Grounded in the concept of mastery-based learning, where learning is demonstrated via action, learners will control what is included in the transcript so that they create their own narratives about their learning experiences. Recognizing that documentation is not the key focus of most STEM OST organizations, this project will provide OST practitioners with support for identifying and codifying learning goals or outcomes that learners and their families find relevant and important within different STEM activities.

This project specifically targets underrepresented learners, who are most at risk of having their formal STEM education disrupted by the pandemic, and who would thus benefit from having alternate means to demonstrate their STEM competencies.

## DIVISION OF RESEARCH ON LEARNING IN FORMAL AND INFORMAL SETTINGS
### American Rescue Plan $499,937

**Title**  Counteracting Stereotypes to Boost Girls' Interest and Participation in Computer Science

**Institution**  University of Houston; Houston, TX

**Research & Recovery**  The goal of this project is to identify and promote critical factors that facilitate the development of girls' interest in pursuing computer science. This will help broaden girls' participation in computer science courses, programs, and college majors. Ultimately, this project will create a foundation for disseminating best practices on effective methods for motivating girls to pursue computer science. The findings will have implications for computer science educators who aim to broaden participation in computer science and others conducting research that aims to reduce educational inequalities linked to stereotypes.

The pandemic has exacerbated disparities across disadvantaged groups. In computer science, there already was a disparity between men and women in the industry, and this award seeks to understand the ways that K-12 schools can better support girls to be interested in and pursue careers in computer science.


## OFFICE OF ADVANCED CYBERINFRASTRUCTURE
### American Rescue Plan $199,592

**Title**  CC* CIRA: Shared Arkansas Research Plan for Community Cyber Infrastructure (SHARP CCI)

**Institution**  University of Arkansas; Fayetteville, AK

**Research & Recovery**  SHARP CCI creates a statewide research cyber infrastructure (RCI) Plan for Arkansas that is focused on the eight degree granting institutions performing science and engineering research. Participating institutions include: Arkansas State University (ASU); Southern Arkansas University (SAU); University of Arkansas (UA) Fayetteville (UAF); UA Division of Agriculture (UADA); UA Little Rock (UALR); UA Medical Sciences (UAMS); UA Pine Bluff (UAPB); and University of Central Arkansas (UCA). A statewide RCI Plan is requisite for organizing and expanding research collaborations and it fosters an economy-of-scale for building compliant facilities and systems and establishing a managed service environment for schools with limited resources.

SHARP CCI includes establishing a comprehensive data science training program, Arkansas Cyber Team (ACT), to provide engineers, educators, researchers, and students access to technical expertise in a broad range of

scientific domains. The project team includes Arkansas Research and Education Optical Network, Great Plains Network, Open Science Grid, and NSF's Engagement and Performance Operations Center to provide engineering and training expertise, managed service experience, and help in implementing a statewide RCI Plan for Arkansas, which is an EPSCoR state.

## DIVISION OF GRADUATE EDUCATION
### American Rescue Plan $2,000,000

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| **Title** | NRT: Research Training in Sustainable Packaging and Biodegradable Polymer Composites for the Next Generation of STEM Graduates |
| **Institution** | Tuskegee University; Tuskegee, AL |

**Research & Recovery**

Current generation packaging materials are made of polymer composites that are derived from petroleum sources. Factors such as greater environmental awareness, societal concerns, and the depletion of petrochemical resources collectively drive a desire to develop new materials and products based on plant fibers and degradable biopolymers. This National Science Foundation Research Traineeship (NRT) award to Tuskegee University will establish a multidisciplinary traineeship in Sustainable Nanobiomaterials. The program is a partnership between three doctoral programs to collaboratively develop innovative sustainable biomaterials for biodegradable packaging systems, including biomedical and food packaging. The project anticipates training 40 students (30 Ph.D. and 10 Masters), including 30 funded trainees, from Materials Science and Engineering, Integrative Biosciences, and Integrative Pathobiology. The Tuskegee NRT effort will produce a large number of minority graduates, including a significant number of women with Ph.D. degrees in STEM.

This award was made to an HBCU that is leading this NRT award. It will directly impact the training of graduate students at institutions that have been disproportionately impacted by the pandemic.

## DIVISION OF MATHEMATICAL SCIENCES
### American Rescue Plan $249,999

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| **Title** | LEAPS-MPS: Structure and Dynamics of Global Supply Chain Networks |
| **Institution** | Brigham Young University; Provo, UT |
| **Research & Recovery** | The need for more robust and resilient global supply chains is highlighted by numerous recent events such as COVID, the Suez Canal obstruction, the Texas power crisis, and the Colonial Pipeline attack. Without good models of supply chain behavior, it is difficult to predict the outcome of disruptions and plan appropriate interventions to minimize future impacts. The principal investigator has acquired complete data on the significant supply chain dependencies of all publicly traded firms worldwide, which opens the door to validated and predictive models. This project will enable the establishment of an interdisciplinary lab at the principal investigator's institution that incorporates participation of under-represented minorities and undergraduates, including building relationships with the Lavassani lab at North Carolina Central University, an HBCU.<br><br>In this project, the PI will develop new methodology in network theory and applies tools from several mathematical areas to study supply chain dependencies of all publicly traded firms worldwide. The mathematical results will be applied to improve the prediction of the outcome of disruptions (due to events such as COVID-19) and plans of interventions to minimize future impacts. |

# Related NSF Research News

Science Matters: NSF supports researchers through the COVID-19 pandemic
Research News: Breath test detects severe COVID-19 infection in seconds
Research News: DNA sensor quickly determines whether viruses are infectious
Science Matters: Turning cells into manufacturing centers