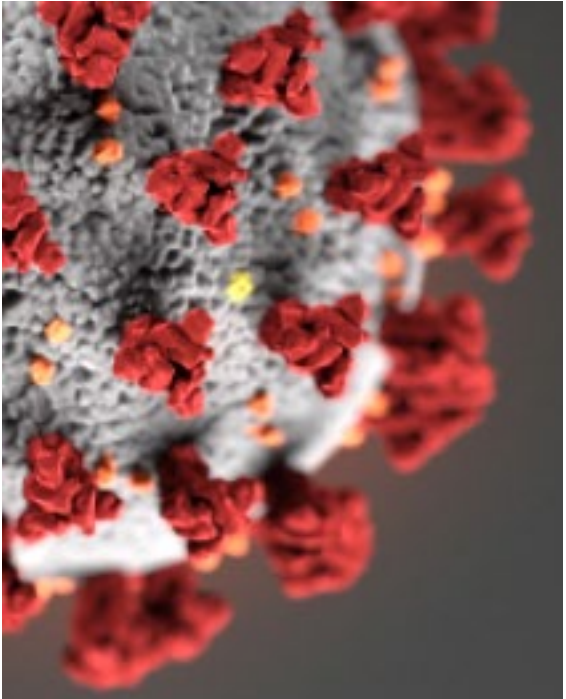


COVID-19 RESPONSE FUNDING UPDATE

January 19, 2021

FACTS

$208,132,911
Funds Mobilized

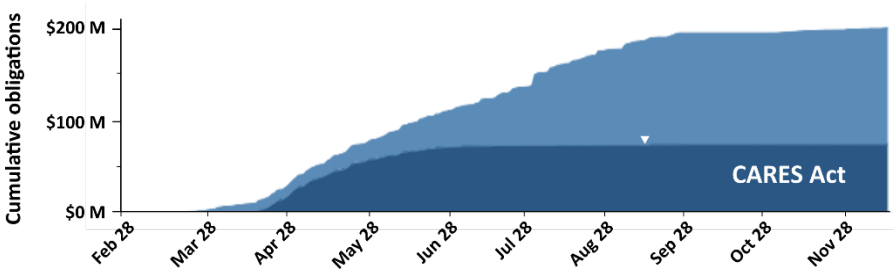
1,229 Awards Funded

OVERVIEW

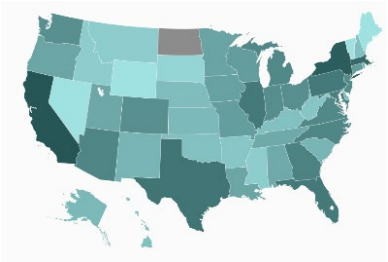
In response to the COVID-19 virus, the U.S. National Science Foundation mobilized funding from the "Coronavirus Aid, Relief, and Economic Security" (CARES) Act as well as NSF's regular appropriations to help the country respond to and recover from the COVID-19 pandemic. NSF supports a wide range of research funding mechanisms, including Rapid Response Research, or RAPID, a fast-tracked grant process to accelerate critical discoveries.

This update spotlights areas of investment relevant to the COVID-19 pandemic and provides a snapshot of the essential work NSF is funding. You can explore all the COVID-19 related research grants awarded through NSF at this link and find a recent summary of NSF's investments on NSF's "Science Matters" blog.

AWARDS



NSF made its first COVID-19 related research award on Feb. 28 and continued to make awards throughout the year. This effort was supported by $75-M of CARES Act funding, 98% of which was awarded by June 30 and the final award was made on Sep. 8 (white triangle on graph).



COVID-19 related awards by state; shade of green correlates to number of awards. Awards were made to over 430 institutions.

RESEARCH HIGHLIGHTS

Groundbreaking study shows airborne virus - A team of researchers from the University of Florida received funding to understand the transmission modes of SARS-CoV-2. The resulting study provided the first ever demonstration that live virus can travel through the air in a hospital room. Capturing and detecting live virus in aerosols is delicate work and requires clever experimental conditions. These results have been essential for improving the accuracy of COVID-19 transmission models. The work was covered in The New York Times.

Monitoring waste for COVID-19 outbreaks - Wastewater testing is allowing municipalities, like Provincetown, Massachusetts and Santa Clara, California, to detect COVID-19 outbreaks early – in some cases even before diagnostic testing has identified local COVID-19 cases. NSF has directly supported projects to validate this technique, including understanding viral persistence in waste and developing reliable biomarkers to identify RNA fragments. Some of the researchers supported by NSF have gone on to partner with local government and industry to implement community wastewater testing. To aid in these efforts, a team from the University of Notre Dame, Howard University, Stanford University and Arizona State University will convene a one-year Research Coordination Network to connect teams from across the country that are studying wastewater testing to address the challenges and share information.

Support for Johns Hopkins' coronavirus dashboard - One of the most well-known projects on COVID-19 supported by an NSF RAPID award is the Johns Hopkins Coronavirus Resource Center. The dashboard was first released publicly on Jan. 22, 2020, to visualize and track the COVID-19 outbreak in real-time and has since served as a preeminent centralized source of COVID-19 epidemiological data.

Societal Experts Action Network (SEAN) - SEAN is an NSF-funded network of leading institutions in the social, behavioral and economic sciences. Established and managed by the National Academies, SEAN translates complex scientific research into policy-accessible language for federal, state and local leaders and other decision-makers as they work to keep their communities safe and speed their recovery from the COVID-19 pandemic. By engaging with stakeholder organizations, such as the National Governors Association and the National Association of Counties, SEAN rapidly produces publications, surveys and webinars in direct response to issues and questions that decision-makers across the U.S. are facing. For example, a recent report, "Encouraging Participation and Cooperation in Contact Tracing: Lessons from Survey Research," provides effective contact tracing strategies that can be used within any community.

Folding @ home - A team led by Greg Bowman at Washington University in St. Louis is leveraging citizen scientists from around the world to combine computing resources to help understand the SARS-CoV-2 virus through the Folding@Home project. Through this effort and with a RAPID award, they have uncovered protein structures that were previously completely unknown to the research community. They are currently screening for potential drugs to target these proteins as possible COVID-19 therapeutics.

Corona discharge for coronavirus-free masks - Ying Zhong and her team at the University of South Florida are developing small-scale, low-cost mask sterilization equipment that applies corona discharge, a suitably named electrical phenomenon; that quickly kills pathogens and can reduce the reuse of contaminated masks. Their innovative work has received substantial news coverage. NSF has also supported research into safer coatings for masks, including a project at Virginia Tech where researchers are designing carbohydrate-based coatings to trap viral particles on a mask's surface.

Pandemic effects on education - Students and educators across the country abruptly moved to online education this Spring leading to unprecedented challenges. Monica Smith is leading a team of researchers at the University of Arizona to explore how students and instructors cope with the challenges, particularly those from underrepresented and underserved Latino and Native American communities. The study will help identify institutional resources and practices that effectively support students and can be employed to inform recovery from the pandemic.

STARTUPS AND COVID-19

Earlier this year, the SBIR/STTR program solicited proposals for the development of new technologies, products, processes and services with the potential to impact the COVID-19 crisis. To date, NSF has awarded more than $15 million to dozens of startups that are putting their technology to work to address the global pandemic.

A few recent awardees:

- BioInfoExperts is creating a cloud-based infection control platform using whole-genome sequencing of SARS-CoV-2, the virus that causes COVID-19, and the patient's individual nasopharyngeal microbiome. Award abstract.
- Mindprint Learning is developing a data-driven approach to improve math education and thereby help students in the virtual learning environment. Award abstract.
- 42BIO is using a magnetic antibody nanoparticle technology to capture and separate COVID-19 antibodies from donor serum. Award abstract.

The U.S. Food and Drug Administration approved the first-ever, self-administered, at-home COVID-19 test Nov. 17, 2020. The diagnostic tool, created by Lucira Health, an NSF STTR awardee, has the capacity to vastly increase accessibility and reduce the public burden of disease transmission. Lucira Health, formerly DiAssess, received NSF support in 2015 for "the development of a widely deployable, inexpensive and accessible diagnostic platform that can rapidly detect infectious diseases in clinical and non-clinical locations."

RESPONSE FROM RESEARCH COMMUNITY

Scientists, engineers and educators across the country collectively volunteered their expertise, supplies and time to help during the pandemic. In mid-March, as supplies dwindled, research labs shared gloves, masks and chemicals used in COVID-19 diagnostic tests with hospitals to support frontline workers. Throughout the spring, 3D printers around the country whirred, printing masks, mask frames and even ventilator splitters. Some of these printers were purchased with NSF funds for research and education, including several Advanced Technical Education program awardees.

A smaller cohort of outstanding researchers responded by applying their expertise in creative new ways, including Cristian Galbiati, an NSF-funded particle physicist who specializes in designing dark matter detecting instruments. When the COVID-19 pandemic forced a research stoppage, he leveraged his team's intimate understanding of gas handling to design a new medical ventilator, built from commonly available, inexpensive parts. In May, the FDA approved the Mechanical Ventilator Milano in record time, under 45 days, for emergency use in the U.S.

Leadership and program officers across NSF worked to quickly issue relevant calls for proposals to fund basic science and engineering questions to understand the virus, model the spread, and encourage the development of processes and actions to address this global challenge. Designed for quick responses to proposals with a severe urgency, the RAPIDs, received the largest number of inquiries to the funding opportunity in the program's history, strikingly, about 10 times more prospective principal investigators reached out than ever before.

RELATED NSF NEWS AND ANNOUNCEMENTS

NSF's official coronavirus webpage.
Fact sheet: NSF-Funded Research Helps in The Fight Against Covid-19.
Fact sheet: Harnessing Computing Power to Fight COVID-19.

NSF's "Science Matters" blogs:

- Life on the ice during a pandemic: Keeping science in Antarctica going and the continent COVID-19-free.
- RAPID responders: How NSF support is enabling the fight against COVID-19 in real time.
- Once considered too high-risk, supercomputer simulations of 'wiggling and jiggling' atoms could help stop coronavirus.
- Why are supercomputers so important for COVID-19 research?

NSF's "Science Matters" blog resources for remote learning:

- 5 NSF-supported STEM education resources that are perfect for virtual learning.
- 7 ways to help your kids with math homework.
- 7 NSF-supported STEM resources that are perfect for at-home learning.