

## **Iowa State University FY23 Federal Research Funding Overview**

Iowa State received a university-record \$206.9 million in federal research funding during the 2023 fiscal year, \$8.7 million or 4.4% more compared to the previous record of \$198.2 million set in FY22.

Three key contributors to the federal funding record Iowa State established in FY23 were the National Science Foundation (NSF), Health and Human Services (HHS) and the National Institutes of Health (NIH), and the U.S. Department of Agriculture (USDA). It's important to note that Ames National Laboratory – a U.S. Department of Energy (DOE) National Laboratory – in tandem with Iowa State University received \$82.8 million in DOE funding in FY23, an increase of \$14.9 million from FY22's total of \$67.9 million.

The \$35.1 million in NSF funding Iowa State received in FY23, topped the university's previous high of \$34.8 million set during the 2018 fiscal year. In addition to the previously mentioned EPSCoR project, here are two other notable projects that received NSF funding during the 2023 fiscal year:

- In March 2023, Alice Alipour and co-PI, Behrouz Shafei, both Cerwick Faculty Fellows in Civil, Construction and Environmental Engineering, received an NSF award to establish an International Research Experience for Students ([IRES](#)) for recruiting, training, and preparing a diverse group of undergraduate and graduate students to become future leaders in addressing challenges faced by civil infrastructures in the 21<sup>st</sup> century. Alipour and Shafei will collaborate with the Swiss Federal Institute of Technology (ETH Zürich) and Swiss Federal Laboratories for Materials Science and Technology (Empa). Through an intensive eight-week program, students will receive world-class mentorship and exposure to the most recent advances at the intersection of innovative structural solutions and data-enabled infrastructure planning and management. These experiences will better prepare students to design, assess and manage more resilient civil infrastructures as practicing engineers and key decision-makers.

*Iowa State aspires to be the most student-centric  
leading research university.*

- In September 2022, Jonathan Wickert, PI and Senior Vice President and Provost, received an award of \$3 million over four years to support The [Louis Stokes Alliances for Minority Participation](#) (LSAMP) program. LSAMP is a program of the Iowa, Illinois and Nebraska STEM Partnership for Innovation in Research and Education (IINSPIRE). IINSPIRE encompasses 16 two- and four-year colleges and universities across the three states. The goal of the alliance – formed in 2011 and led by Iowa State – is to grow the pool of college-ready, STEM-prepared underrepresented minority population students and improve retention of these students at the alliance institutions. Having achieved key milestones, over the first 10 years of the LSAMP program, the goal is to achieve 875 degrees annually by the end of the next five-year period.

*Iowa State aspires to be the university that cultivates a diverse, equitable, and inclusive environment where students, faculty, and staff flourish.*

- Elderly and low-income residents suffer disproportionately from extreme heat during the summer months, so Iowa State researchers are leading an effort to develop innovative tools to better – and more specifically – predict when such emergencies might affect residents’ homes. In August 2022, the research team, led by Ulrike Pässe, professor of Architecture and director of the [Center for Building Energy Research](#), received an award of \$1.2 million from NSF. These funds will support a three-year project to gather data and develop sophisticated machine-learning tools capable of giving residents in higher-risk Des Moines neighborhoods more time to prepare for dangerous heat in their homes. The researchers are collaborating with officials from the city of Des Moines, Polk County, and researchers at the University of Northern Iowa and the University of Texas at Arlington and plan to make their tools widely available after the conclusion of the grant.
- In November 2022, Ruslan Prozorov, professor, Condensed Matter Physics and Senior Physicist for Ames National Laboratory, received an NSF award of nearly \$580,000 for a three-year project. In this study, Prozorov will explore the interplay between charge-density-wave (CDW) and superconductivity in a system where CDW is tuned continuously to a structural quantum critical point (QCP) by changing the composition. The project’s ultimate goal is to identify common motifs and features due to QCP inside the superconducting phase. This project includes a critical Broader Impacts component focused on supporting a new generation of young scientists, with a strong emphasis on

diversity and inclusion. Plus, it will create the foundation for a mid-scale implementation proposal to NSF to establish a first-in-the-U.S.A. variable-temperature electron-irradiation user facility with in-situ characterization specifically for condensed matter physics (CMP) research.

Iowa State received slightly over \$25 million in research awards from the various agencies of Health and Human Services (HHS) and the National Institutes of Health (NIH) during the 2023 fiscal year. This HHS funding is a new record for Iowa State, eclipsing the previous high of \$20.7 million in FY22 by \$4.3 million, or 20.9%. Here are overviews of two of the university's new notable projects receiving funding.

- At the start of the new fiscal year, in July 2022, executive director Paul Plummer and the [National Institute of Antimicrobial Resistance Research and Education](#) (NIAMRRE) received an initial installment of \$500,000 from the Food and Drug Administration (FDA) to support a three-year project with an estimated total award of \$1.5 million. The project will tap into the deep species expertise of institute partners – Iowa State (swine), University of California Davis (dairy cattle), University of Georgia (broiler chickens), Ohio State University (beef cattle) – to prioritize the most significant diseases and identify the most effective alternative treatment strategies. The long-term benefit is reducing antibiotic use in food-producing animals and improving public health by preserving antibiotic efficacy into the future.
- In May 2023, Jacob Meyer, assistant professor of Kinesiology, received an award of nearly \$752,000 from the National Institute of Mental Health (NIHM). The two-year project will explore the research team's hypothesis that aerobic exercise, or priming, prior to cognitive behavioral therapy (CBT) will improve the potency and efficacy of this treatment for major depressive disorders. One of the project's novel aspects is it will employ a machine learning-based approach to objectively assess the effects the exercise priming approach has on the mechanisms of CBT.

USDA research funding at Iowa State returned to a more typical level of \$32.7 million in FY23, following a new university record of \$48.4 million in FY22. Here are a few examples of innovative new projects USDA initiated at Iowa State in FY23.

- In April, Giovanni Trevisan, assistant professor, Veterinary Diagnostic and Production Animal Medicine, received a [\\$1 million award](#) from USDA National Institute of Food and Agriculture (NIFA). The funds support a three-year project focused on improving early

detection of disease threats that can spread rapidly through the nation’s swine herd. The research team will use data from the [Swine Disease Reporting System](#) (SDRS) to implement next-generation monitoring and surveillance capabilities that will quickly and proactively detect emerging or re-emerging disease agents – alone or in combinations – at national and regional levels. While this project is specific to swine, the process and models that come out of it can be adapted to other species, like poultry and cattle.

- Commercial poultry production is one of the fastest growing segments in the global agricultural industry, and the U.S. is the largest poultry producer in the world. In January 2023, associate professor of Molecular Microbiology Melha Mellata, received an award of \$635,000 from USDA-NIFA to support a four-year project to explore improving chickens’ overall health by improving their gut health in early life. Mellata and her team are expanding on previous research to determine if Segmented filamentous bacteria (SFB) could be used as a novel probiotic and “green” alternative for combatting disease pathogens.
- Creating actionable roadmaps that integrate science and engineering with policy and education is critical for implementing sustainable food and energy systems. Mark Mba-Wright, associate professor, Mechanical Engineering, is leading a three-year \$1 million USDA-NIFA-funded project focused on developing an integrated agriculture and biorefinery decision-making framework to support Climate-Resilient Biorefineries and Landscapes (CREBL) to help achieve a more sustainable bioeconomy. Existing policy-making frameworks are either too broad or too focused in scope to address the question of how climate change would impact agricultural land use and biorefinery technology adoption. CREBL bridges this gap by providing a rich analysis of the agriculture landscape and diversity of biorefinery configurations within various climate-change scenarios.

*Iowa State aspires to be the trusted partner for proactive and innovative solutions.*

Here are a several additional notable Iowa State Research projects that received federal funding in the 2023 fiscal year . . .

- In August 2022, Kaoru Ikuma, associate professor in Civil, Construction and Environmental Engineering, received just over \$3.2 million from the U.S. Environmental Protection Agency (EPA) to support a four-year research effort. Ikuma and her team will [explore water reuse](#) as a means of improving water security in frequently overlooked small rural communities. The team will use an integrated research and engagement approach designed to: address knowledge gaps and generate frameworks for overcoming barriers to adoption; and use research outputs to evaluate and accelerate community readiness for reuse through case studies centered on five small rural communities across the U.S.
- In January 2023, Yiliang Liao, associate professor of Industrial and Manufacturing Systems Engineering, received an award of \$440,600 from the DOE REMADE INSTITUTE, Sustainable Manufacturing Innovation Alliance Corp. The award of \$440,600 – plus a cost share in the same amount – is for a two-year project to explore developing a novel remanufacturing technique that uses hybrid laser surface processing for effective removal of corrosion and coatings, and fast repair of metallic surfaces to extend the use life of a variety of key engineering components, like cylinder blocks and heads and exhaust manifolds.
- In October 2022, Ravikumar Gelli, research assistant professor in Electrical and Computer Engineering, received \$1.5 million of an estimated \$2 million total award from DOE’s National Energy Technology Laboratory (NETL). Gelli is leading a multidisciplinary, multi-institutional team focused on using next-generation technologies, like artificial intelligence (AI) and edge computing, to help ensure modern energy delivery systems are designed, installed, operated, and maintained to quickly recover from grid disturbances and cyberattacks. The three-year project aligns with the DOE goal of providing cleaner and cheaper power to Americans while advancing President Biden’s goal of a 100% clean electrical grid by 2035 and net-zero carbon emissions by 2050.
- Amie Zarling is a clinical psychologist and associate professor of Human Development and Family Studies at Iowa State who has well over a decade of experience working with domestic violence populations – both survivors and those who cause harm. Understanding that most traditional Relationship Violence Intervention Programs (RVIPs) have demonstrated limited success in curbing intimate partner violence (IPV), Zarling worked with the Iowa Department of Corrections to first develop and then expand implementation of her novel acceptance and commitment therapy-based RVIP known as ACTV. Zarling and her colleagues also understand traditional RVIPs that take place after criminal justice involvement are particularly ineffective for men of color.

That's why the team – in collaboration with the [Iowa Coalition Against Domestic Violence](#) – created ProACTIVE, an adapted version of ACTV that is trauma-informed, culturally responsive and suitable for men in the community who are not justice-involved. Zarling and her team received an award of \$450,000 from the U.S. Department of Justice to conduct a feasibility and initial effectiveness study around ProACTIVE to: 1) Evaluate the level of engagement with the program among the target audience of men of color; 2) Assess ProACTIVE's impact in reducing IPV behaviors; and 3) Determine if ProACTIVE can be replicated and expanded.

- Prior to 2023, Agronomy professor, Brian Hornbuckle, had received eight research awards from the National Aeronautics and Space Administration (NASA). In January, [he secured his ninth](#) – an initial installment of \$180,235 on a three-year project estimated to total just over \$536,000. Hornbuckle will combine data from two NASA orbiting observatories – the Soil Moisture Active Passive (SMAP) satellite and ECOSystem Spaceborne Thermal Radiometer Experiment (ECOSTRESS) aboard the International Space Station – to identify early signs of crop stress. The research also will contribute to the ever-growing understanding of how water moving between Earth's surface and atmosphere affects weather and climate, one of the overall goals of monitoring moisture levels with satellites.

*Iowa State aspires to be the university that creates opportunities and forges new frontiers.*

- NASA provided another research award – of just over \$660,000 – in May 2023 to Todd Kingston, assistant professor, and Cary Pint, Charles Schafer (Battelle) Chair of Engineering and associate professor, both in Mechanical Engineering. [Their three-year project](#) could play a key role in the success of future lunar and Martian space missions. Their work, supported by [Iowa NASA EPSCoR](#), is focused on determining and quantifying the fundamental electrochemical and thermomechanical mechanisms that are altered in Lithium-ion batteries in freeze-thaw cycles. This knowledge is critical for developing better batteries that can hibernate through and/or operate in the extreme thermal conditions associated with space travel.