2024 NSAC Spring Meeting

Supporting the Workforce

APRIL 26th, 2024

BROADENING PARTICIPATION IN STEM

https://new.nsf.gov/funding/initiatives/broadening-participation

Souleymane Diallo

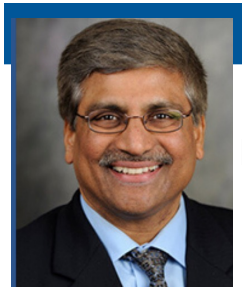
Program Director

Division of Materials Research (DMR)

National Science Foundation

somardia@nsf.gov

The National Science Foundation



Dr Sethuraman Panchanathan
NSF Director

Office of the Inspector General (OIG)

National Science Board (NSB)

NSB Office

NSF Director
Chief Organization Officer

- Office of the General Counsel (OGC)
- Office of Equity and Civil Rights (OECR)
- Office of International Science & Engineering (OISE)
- Office of Integrative Activities (OIA)
- Office of Legislative & Public Affairs (OLPA)

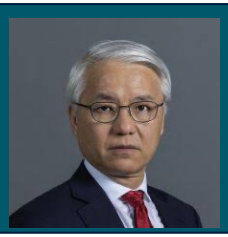
- Technology, Innovation and Partnerships (TIP)
- Biological Sciences (BIO)
- Computer & Information Science & Engineering (CISE)
- Engineering (ENG)
- Geosciences (GEO)
- Mathematical & Physical Sciences (MPS)

- Social, Behavioral & Economic Sciences (SBE)
- Education & Human Resources (EDU)
- Budget, Finance & Award Management (BFA)
- Information & Resource Management (OIRM)

The Directorate for Mathematical and Physical Sciences (MPS)

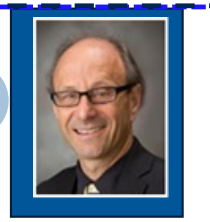
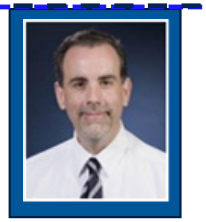
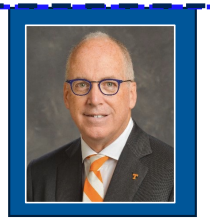
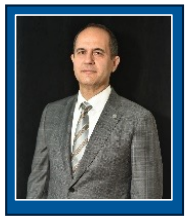
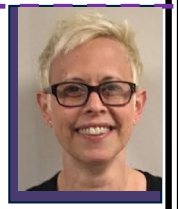
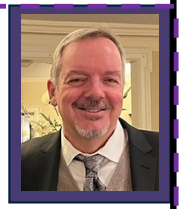
Acting Assistant Director

C. Denise Caldwell



Deputy Assistant Director

Tie Luo

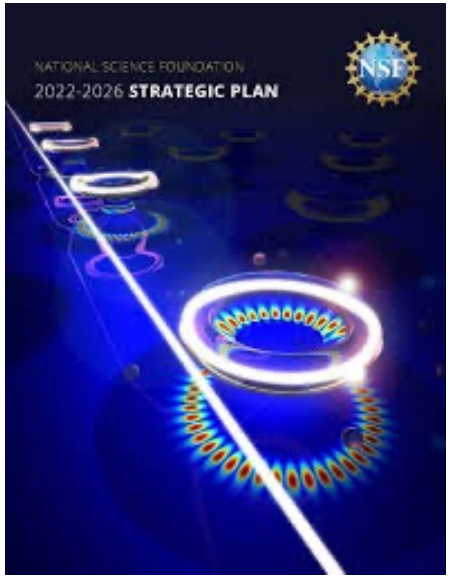
	Division of Astronomical Sciences	Division of Chemistry	Division of Materials Research	Division of Mathematical Sciences	Division of Physics
Division Directors	 R. Chris Smith	 David Berkowitz	 Germano Iannacchione	 David Manderscheid	 Saul Gonzalez
Deputy Division Directors*	James Neff 	Lilin He 	M. Deutsch 	Jupin Wang 	M.J. Cavagnero 

How is NSF Broadening Participation?

"World-class science is shaped by a wide range of perspectives. Our nation needs every person who is interested in pursuing a STEM career to be able to do so." **NSF Director**

NSF's commitment to broadening participation in STEM through Diversity Equity and Inclusion is imbedded in its **strategic plan through a variety of investment** priorities, including:

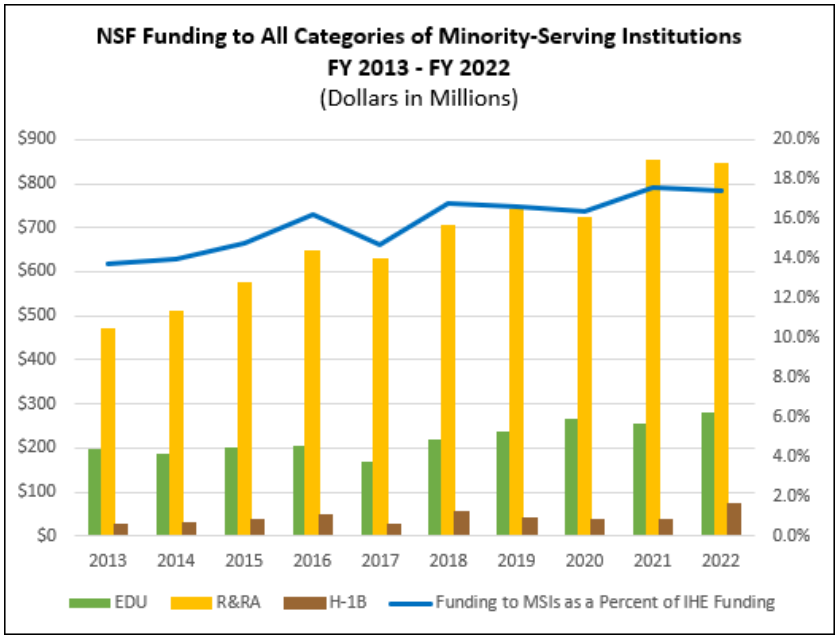
- ❑ Preparing a diverse, globally engaged STEM workforce;
- ❑ Integrating research with education, and enhancing the Nation's research capacity;
- ❑ Expanding efforts to broaden participation from underrepresented groups and diverse institutions across all geographical regions in all NSF activities; for better societal outcomes.
- ❑ Improving processes to recruit and select highly qualified reviewers and panelists that reflect the Nation's diversity.

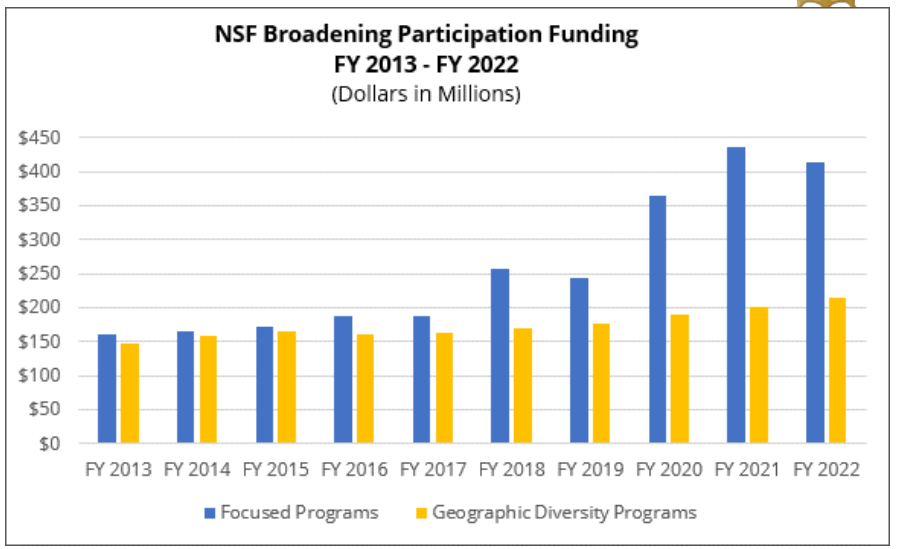


NSF Strategic Plan 2022-2026

How is NSF Broadening Participation?

- **Focused programs** => BP as an explicit goal (e.g. HBCU-up, HSI, EXPAND-QISE, MPS-ASCEND, CREST-PRP…)
- **Emphasis programs** => BP as one of several emphases. *e.g. MSI, > 50% of its PIs or/and students/postdoc as members of URG (STCs, MPS 5Ps, MRIs…)*
- **Geographic Diversity program** => (EPSCoR)





Funding over the last decade - Established Program to Stimulate Competitive Research **(EPSCoR)** – Geographic Diversity vs Focused Programs

NSF supports the preparation of the future STEM workforce that is diverse and includes the full spectrum of talent.

Research Experiences for Undergraduates (REU) Sites & Projects

- Engage undergraduate students in research.
- Based in a single discipline or interdisciplinary research.
- Involve students from other Institutions in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program.

Research Opportunity Awards (ROA)

- Part of the RUI solicitation (NSF 14-579)
- Supports PUI faculty to work as visiting scientists at research-intensive organizations where they collaborate with other NSF-supported investigators.

Growing Research Access for Nationally Transformative Equity and Diversity (Granted)

GRANTED supports ambitious ideas and innovative strategies to address challenges and inequities within the administrative research support and STEM training infrastructure particularly at emerging and minority-serving institutions of higher education.

- Reducing barriers in accessing resources to support competitive research and training programs and projects
- Developing and improving Research Enterprise functions, services and workforce
- Collaborations and partnerships across research and training communities, colleges, and universities, and professional societies with interest in a robust research enterprise
- Sharing and catalyzing solutions that lead to national transformation
- Responds to CHIPS and Science legislation –"Emerging Research Institutions"

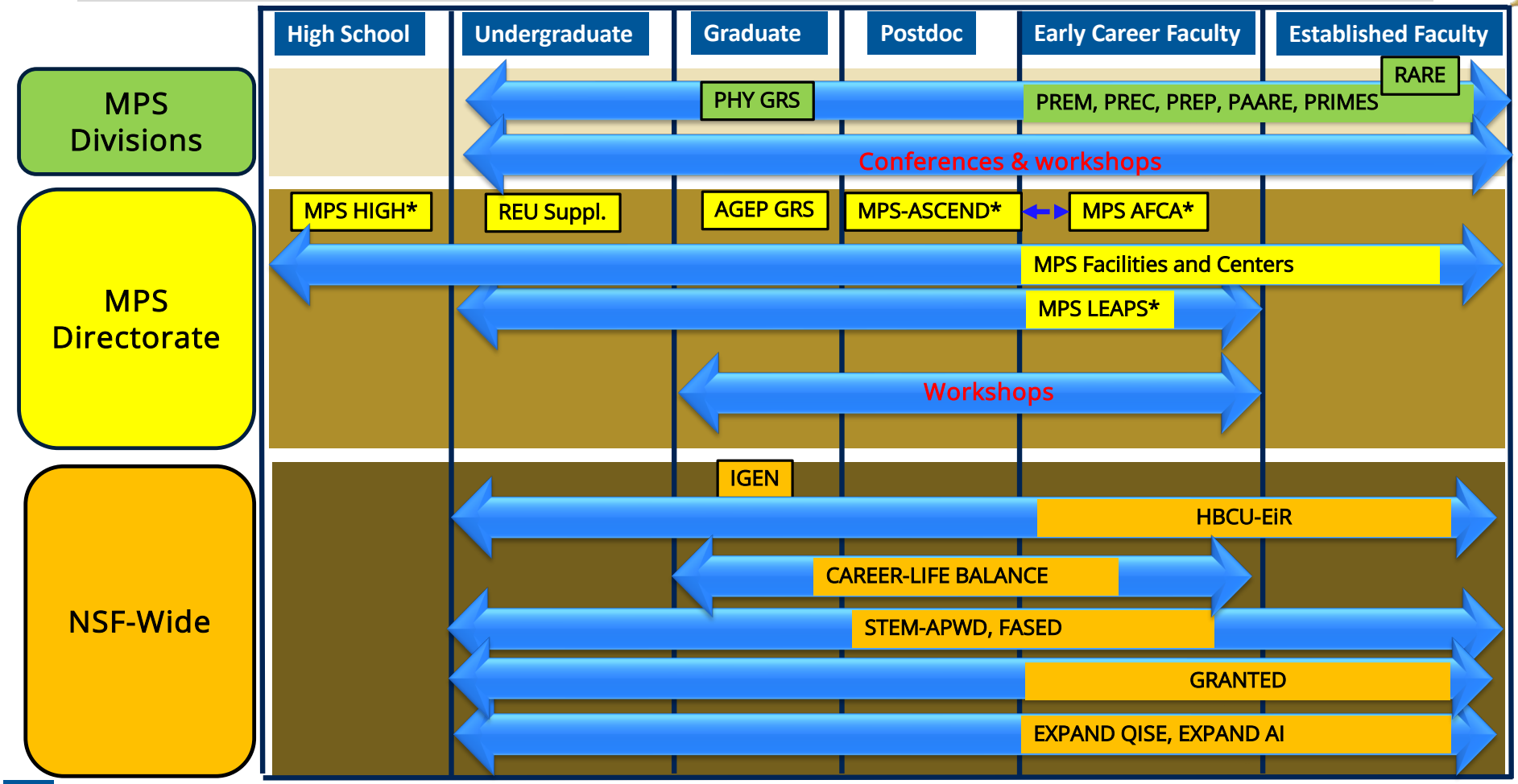
RECENT GRANTED INVESTMENT:
$20M investment across eight institutions
$9.2M research infrastructure award to support 16 MSIs
$2M for conferences and workshops to MSIs and ERIs

PD 23-221Y
DCL 23-152

Directorate for Mathematical and Physical Sciences (MPS)

The mission of NSF's MPS is to harness ***the collective efforts*** of the mathematical and physical sciences communities to address the most compelling scientific questions, ***educate the future advanced high-tech workforce***, and promote discoveries to meet the needs of the Nation.

MPS invests in people throughout the STEM pathway via DIV-specific, MPS-wide, NSF-wide, & partnership activities



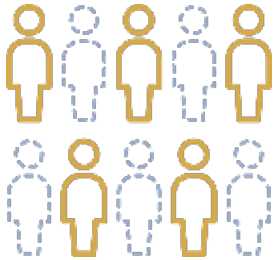
Partnerships for Research and Education in MPS (PREM, PREC, PREP, PAARE, PRIMES or 5P)

GOALS

- **Increase recruitment, retention and degree attainment** by members of those groups most underrepresented in Mathematical and Physical Sciences research
- **Support excellent research and education endeavors** that strengthen such partnership
- **PREM, PREC, PREP, PAARE, PRIMES** (HBCU, HSI, AANAPSI, R2 Institutions)

Partnerships

Expanding Geography of Innovation



Missing Millions

5P: PAARE, PREC, PREM, PREP, PRIME
Partnerships for Research and Education in the Sciences

NSF 24-516 **PAARE** Partnerships in Astronomy & Astrophysics Research and Education

KAPEMNI

In Dakota sky knowledge, a Kapemni is a symbol of mirroring between earth and sky. It is drawn as two teepees connected at their apex. The bottom one represents the Earth, the top one is upside down and represents the sky. The apex is a point of passage between these two aspects of the world.
The Kapemni program will provide resources to improve visibility and accessibility of STEM disciplines through outreach and astrophysics-related events on campus, observing nights, and guest speakers.
Minnesota Institute for Astrophysics & the University of Minnesota Morris

NSF 21-260 **PREC** Partnerships for Research and Education in Chemistry

PREC FOR SUSTAINABLE POLYMERS

The Department of Chemistry at **Clark Atlanta University (CAU)** aspires to become a leading provider of chemistry education and research that attracts and prepares diverse students to be scientifically literate and competitive professionals to meet the future demands of the changing global environment. The partnership between the Department and the **NSF Center for Sustainable Polymers** expands the opportunities for African American students to conduct cutting-edge research in the chemistry, characterization, and processing of sustainable polymers made using the principles of Green Chemistry.

NSF 21-512 **PREM** Partnerships for Research and Education in Materials

PREM VENTURES

The partnership between **Navajo Technical University (NTU) & the NSF Materials Research Science and Engineering Center (MRSEC) at Harvard University**.
The partnership focuses on investigating scientific problems whose solutions can improve the lives and environment of the Navajo Nation. The partnership explores the materials science of traditional foods, dyes for weaving, and other Navajo technologies, with an approach imbued with respect for Navajo Traditional Knowledge. This approach provides culturally-centered research and educational infrastructure, supporting the growth of STEM pathways for Native American students.

NSF 24-514 **PREP** Partnerships for Research and Education in Physics

The partnership between **Texas Southern University (TSU) & the Center for Theoretical Biological Physics (CTBP, Rice University)** impacts students from underrepresented and underserved communities consistent with the largest segment of the student population on the TSU campus (greater than 80%). The project is aimed at improving the retention and academic preparedness of the graduates. The research concerns the effect of low dose radiation on cells and their genetics, with a focus on developing collaborations particularly in the areas of fundamental modeling of chromatin structure and dynamics, and modeling of gene signaling networks coming from the CTBP side.

NSF 24-517 **PRIMES** Partnerships for Research Innovation in the Mathematical Sciences

The partnership between **Fort Lewis College (FLC), a minority-serving institution, & the American Institute of Mathematics** aims at furthering research in pure mathematics at FLC in a way that increases both research output at a primarily undergraduate institution (PUI) and inclusivity among historically underrepresented (UR) students. FLC's historic mission is the education of American Indian and Alaska Native student populations. First-generation college students comprise nearly half of the student body. The partnership will focus on both research excellence and increased retention of first-year UR students, especially in the STEM disciplines, who may struggle both academically and with a sense of belonging in college.

CATALYZING CONTRIBUTIONS TO THE MATHEMATICAL & PHYSICAL SCIENCES BY ALL

Three New MPS-wide funding opportunities for Early Career Researchers.

Goals: *Broaden participation by members from groups underrepresented in Mathematical and Physical Sciences, including Blacks and African Americans, Hispanics, Latinos, Native Americans, Alaska Natives, Native Hawaiians, and other Native Pacific Islanders.*

- Launching Early-Career Academic Pathways in MPS– LEAPS-MPS / NSF-22-604 (**pre-tenure Faculty**)

  Awards are for 24 months and are up to $250,000 total costs (direct plus indirect).

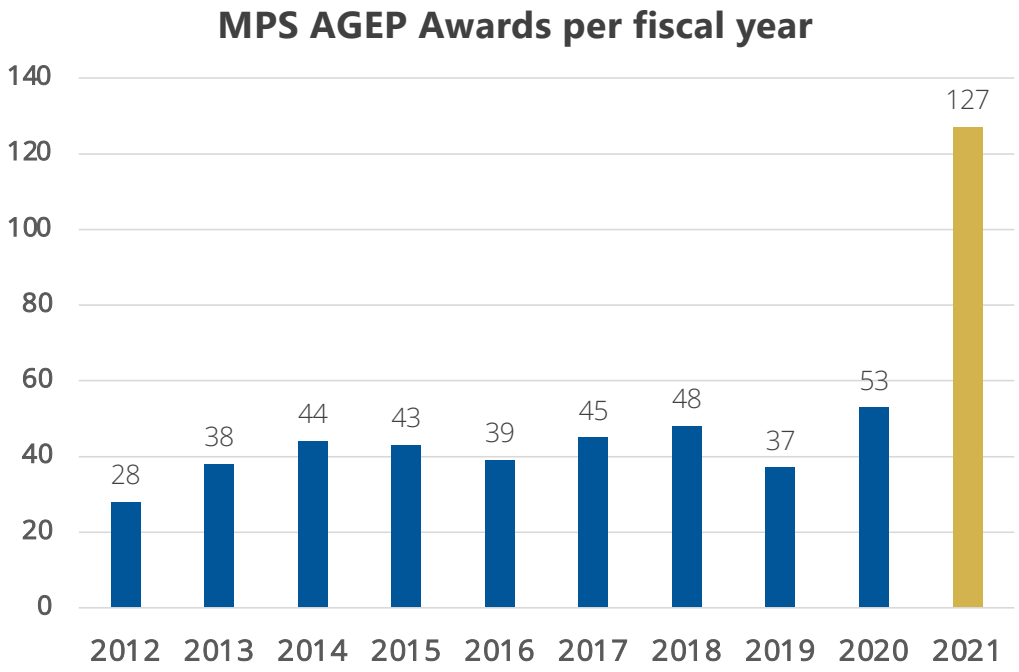
- MPS Ascending **Postdoctoral** Research Fellowships – MPS-ASCEND / NSF-23-501

  Awards are for 36 months and are up to $100,000/year (stipend, fringe benefits, relocation etc..).

- **MPS Ascending Faculty Catalyst Awards (MPS-AFCA NSF-23-628) – *By Invitation only***

  Awards are for 24 months and are up to $150,000/year (strategic investment to maximize impact)

MPS AGEP Graduate Research Fellows



- Collaboration between the NSF Alliances for Graduate Education and the Professoriate (AGEP) program in the Education and Human Resources(EDU) Directorate and the Directorate of Mathematics and Physical Sciences (MPS).
- ***PIs requesting a supplement must be either at or collaborating with faculty at an institution that has received an EDU AGEP award.***

- ***Supplement*** for a **current** MPS **research** awardee for one (additional) Ph.D.
  - **Improve diversity and retention** at the doctoral level within the mathematical and physical sciences.

NSF's National Facilities and Instrumentation (NaFI)

National Facilities are **research facilities with specialized instrumentation** available to the broad research community. These facilities provide **specialized instrumentation** and **unique research capabilities** that can be located at only a few highly specialized laboratories in the Nation. These facilities also have in their **mission the training and education of the next generation workforce** (REU, RET, K-12, Postdoctoral training etc..).

The current NaFI Portfolio, that helps support nanotechnology research, development and deployment, includes:

- **Facilities for which DMR is the steward**
  - *NSF **National High Magnetic Field Laboratory** (NHMFL)*
  - *NSF **Center for High Energy X-ray Sciences** (CHEXS) @ Cornell High Energy Synchrotron Source (CHESS)*
  - *NSF **Materials Innovation Platforms** (MIP)*

- **Facilities under DMR Partnership with others**

  At NSF:
  - *NSF/CHE led: **ChemMatCARS** beamline at the Advanced Photon Source, Argonne*
  - *NSF/ENG led: National Nanotechnology Coordinated Infrastructure (NNCI)*

  at other government agencies:
  - *NSF/NIST **Center for High Resolution Neutron Scattering** (CHRNS)*

- **Major Research Instrumentation & Mid-Scale Research Infrastructure**

MIP: PARADIM at Cornell University, DMR-2039380

User Program – Update 2023

A PARADIM for Jumpstarting Academic Careers

Materials Innovation Platforms provide free access and training at state-of-the-art equipment. Based on accepted projects to use **PARADIM**, our User Program is particularly interesting for young researchers and faculty at the start of their own research group, when required equipment or well-trained personnel might not be readily available at their home institutions.

Most importantly, access to PARADIM includes support by scientific staff. Independent research projects can be pursued immediately and the projects' associated users—usually graduate students—receive invaluable hands-on training and guidance on all aspects of their Materials-by-Design discoveries.

Academic Rank of External PIs

Examples of Assistant Professors whose success at PARADIM led to subsequent funding

Daniel Bediako (UC Berkeley)
NSF-CAREER 2022

Jason Kawasaki (U. Wisconsin-Madison)
AFOSR YIP 2020

Antia Botana (Arizona State University)
NSF-CAREER 2020 Sloan Fellow 2022
ALFRED P. SLOAN FOUNDATION

Henry La Pierre (Georgia Tech)
Sloan Fellow 2022
ALFRED P. SLOAN FOUNDATION

Ryan Comes (Auburn University)
AFOSR YIP 2019 NSF-CAREER 2020

Martin Mourigal (Georgia Tech)
NSF-CAREER 2017
DOE-BES

Serena Eley (Colorado School of Mines, now University of Washington)
NSF-CAREER 2020

Julia Mundy (Harvard University)
DOE-BES 2021
Sloan Fellow 2022
ALFRED P. SLOAN FOUNDATION

Lauren Garten (Georgia Tech)
AFOSR YIP 2021 ONR YIP 2022

Huiwen Ji
(University of Utah)
NSF Career 2021

Jian Shi
(Rensselaer Polytechn. Inst.)
NSF-CMMI
NSF-EPMD
ARO-STIR

Samaresh Guchhait
(Howard University)
NSF-MRI

A. Shoji Hall
(Johns Hopkins University)
NSF Career 2020

Vladan Stevanovic
(Colorado School of Mines)
NSF-CAREER 2019

DMR DIVISION OF MATERIALS RESEARCH
DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

Where Materials Begin and Society Benefits

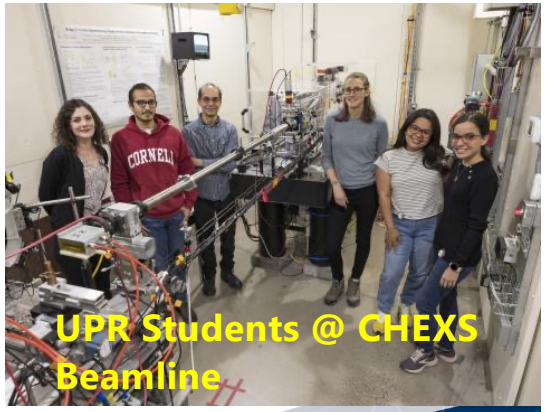
PARADIM
AN NSF MATERIALS INNOVATION PLATFORM

Training, Mentoring and Education Opportunities at NSF & NSF Supported Facilities

2023 NSF New Investigators Workshop

2022 LEAPS PI Meeting@ NSF Headquarters

2023 CHRNS Summer School



UPR Students @ CHEXS Beamline

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