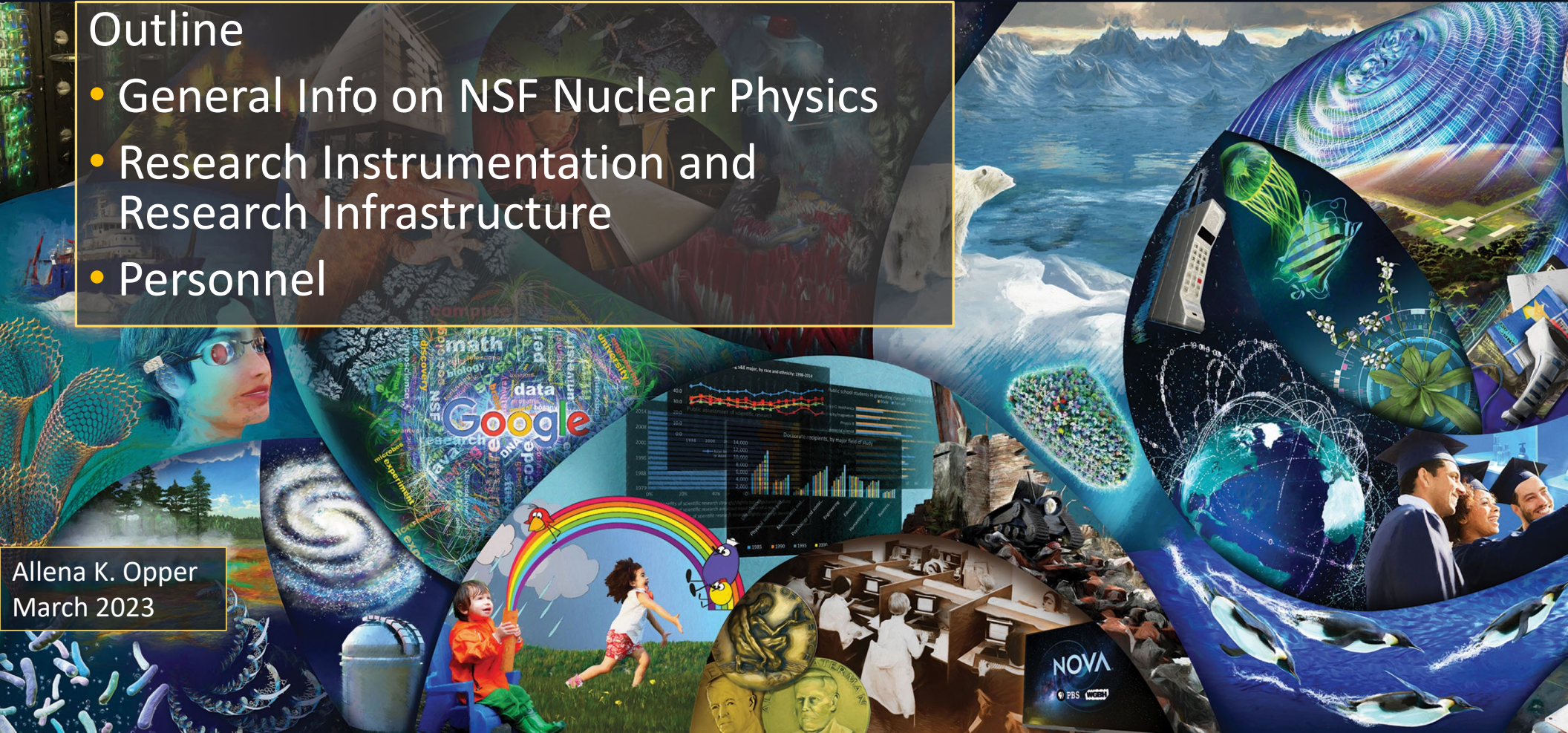




# National Science Foundation – Nuclear Physics

- ## Outline
- General Info on NSF Nuclear Physics
  - Research Instrumentation and Research Infrastructure
  - Personnel



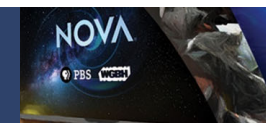
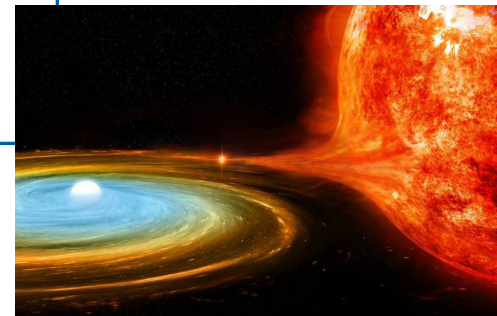
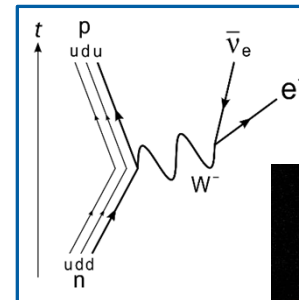
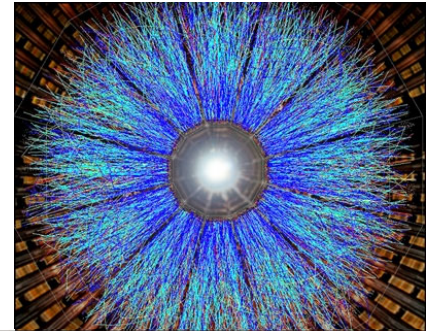
Allena K. Opper  
March 2023



# NSF Nuclear Physics

Supports the study of nuclear constituents, reactions, and structure within nuclei and nucleons – and in stars, *as understood through the strong and electroweak interactions.*

- Nuclear and hadron QCD
- Nuclear astrophysics, reactions, and structure
- Nuclear precision measurements of fundamental symmetries and constants
- University labs (FSU & UND)
- Nuclear Theory & Theory Hubs
- Co-review and co-funding with other NSF programs





# Precision Measurements

NSF 20-127 Dear Colleague Letter: Searching for New Physics Beyond the Standard Model of Particle Physics Using Precision Atomic, Molecular, and Optical Techniques

- Encourages interdisciplinary research across AMO and EPP to search for Physics Beyond the Standard Model
- Includes research, conceptual development, conferences, development of new instruments
- Proposal titles should begin with “PM: title”

e.g. electron or neutron EDM, Project 8, magnetic quadrupole moments, etc.

## Nuclear Physics Included





# Windows on the Universe (WoU-MMA)

Supports research to advance the interoperability of studies using electromagnetic waves, high-energy particles including neutrinos and cosmic rays, and gravitational waves to realize integrated, *multi-messenger* astrophysical explorations of the universe.

- Coordination: hardware, software, or other infrastructure to coordinate observations using more than one messenger
- Observations: observations of astroph objects or phenomena that are potentially sources of more than 1 messenger
- Interpretation: theory, experiment, simulations and other activities to understand or interpret observations of astroph objects that are sources of more than 1 messenger

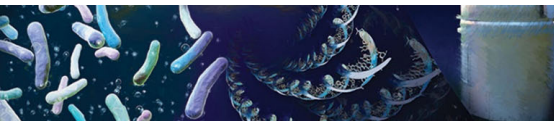
Proposal title should begin with “WoU-MMA: title”





# Major Research Instrumentation (MRI) NSF 23-519

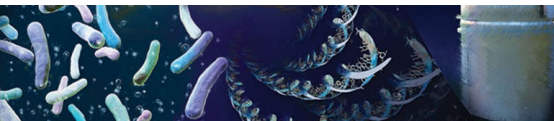
- Two tracks:
  - Track 1 \$100 k < \$ from NSF < \$1.4 M; up to 2/university
  - Track 2 \$1.4 M < \$ from NSF < \$4 M; 1/university
  - Track 3 acquisition, development, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium; 1/university
- Two types: development and acquisition; both need to be “shovel ready”
- Deadlines & details
  - October 16 – November 15, 2023, (a window of opportunity)
  - <https://www.nsf.gov/od/oia/programs/mri/>
  - <https://www.nsf.gov/pubs/2023/nsf23519/nsf23519.htm>
  - *Contact your program directors well ahead of time to discuss & avoid pitfalls*
  - Awards above \$1M compete across the entire Foundation
  - ~~30% cost share req'd for PhD granting institutions~~





# PHY Mid-scale Research Instrumentation

- Design and Construction *or* Acquisition of Instrumentation
  - “shovel ready”
  - R & early D, operations *funded by research programs*
- ~ \$4M < TPC < ~ \$20M (including contingency); over multiple years
- Selection based on
  - merit review, technical and project management review
  - exceptional opportunity
  - research community priorities.
- For more info, see PHY Solicitation & talk with PHY program directors





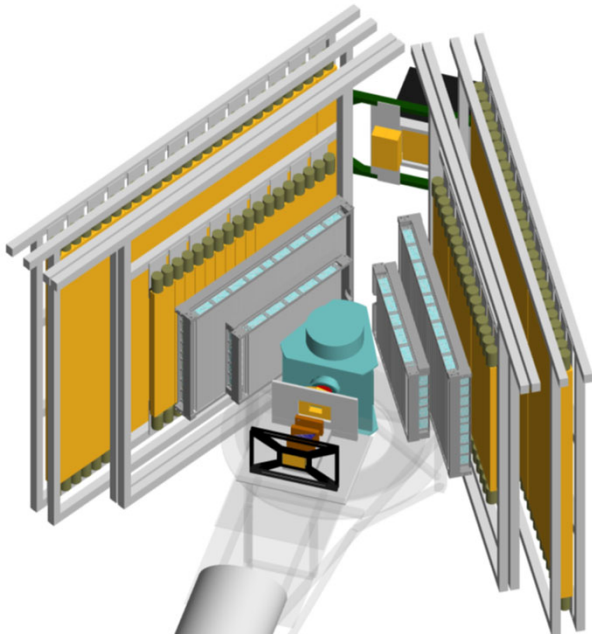


# PHY Mid-scale Research Instrumentation (cont)

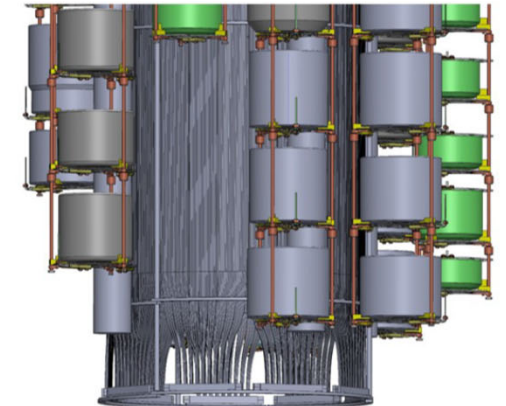
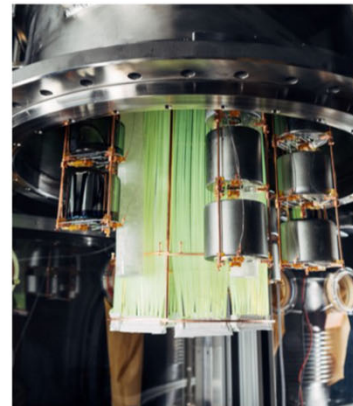
Currently 5 ENP Midscale projects: nEDM@SNS, [MUSE](#), [LEGEND-200](#), MOLLER, BL3



- Simultaneous e/ $\mu$  scattering from LH<sub>2</sub>
- Lepton universality
- Proton radius



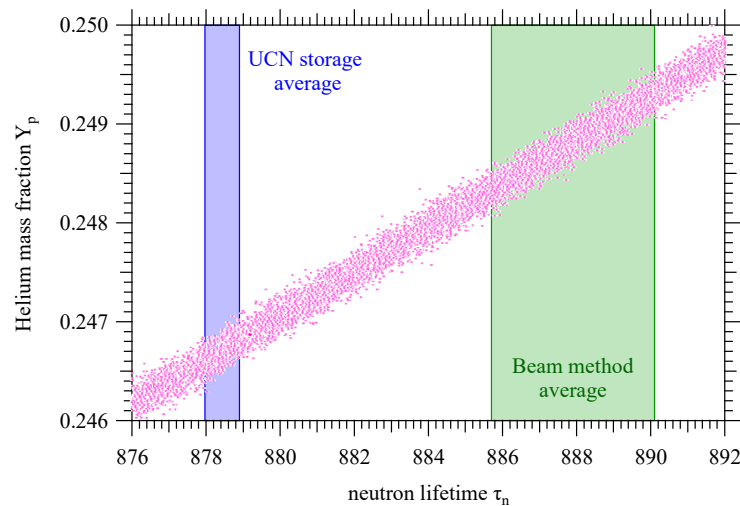
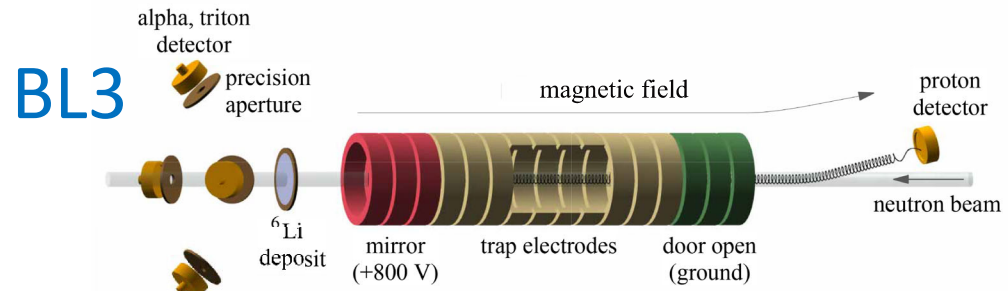
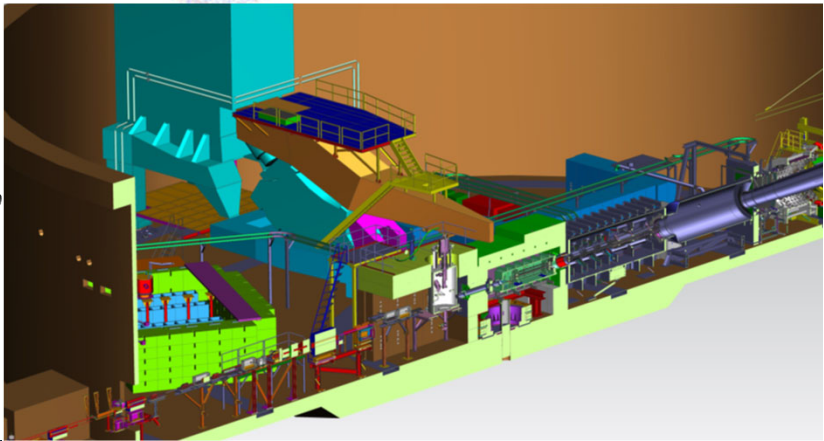
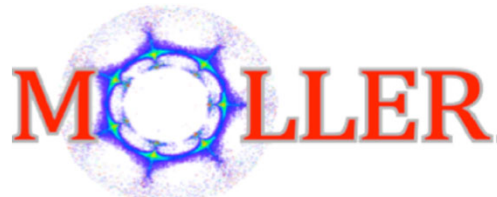
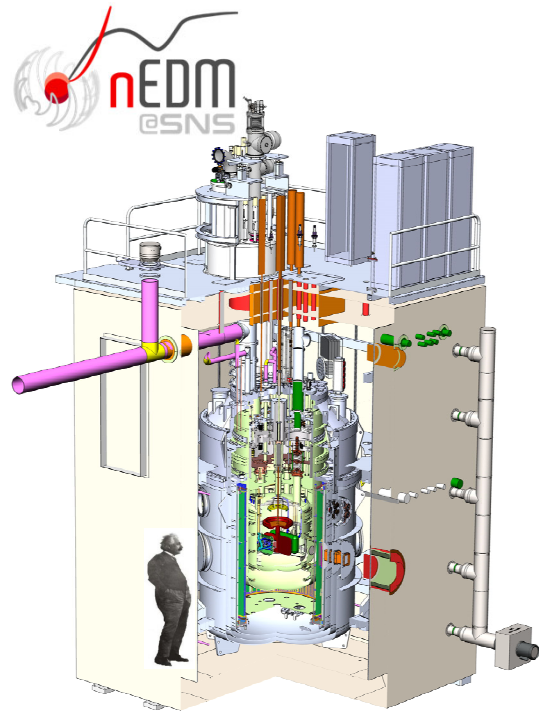
- Beginning to take “production” data; ~ 140 kg Ge
- Additional ~ 60 kg to be installed late 2023





# PHY Mid-scale Research Instrumentation (cont)

Currently 5 ENP Midscale projects: nEDM@SNS, MUSE, LEGEND-200, MOLLER, BL3







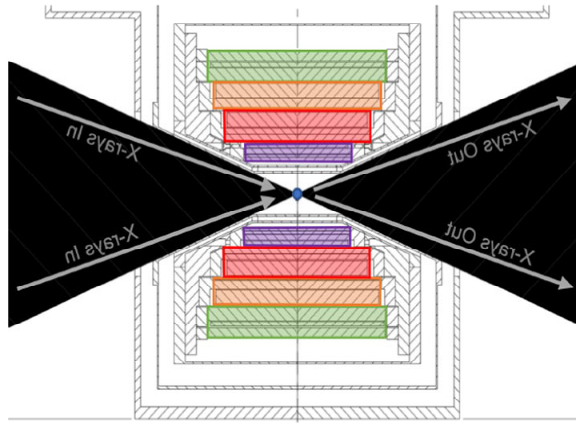
# NSF Mid-scale Research Infrastructure

- Mid-scale Research Infrastructure-1 (MsRI-1) [NSF 22-637](#)
  - Implementation = “shovel ready”;  $\$6\text{M} < \text{total request} < \$20\text{M}$
  - Design/development = to prepare MsRI implementation proposal;  $\$600,000 < \text{total request} < \$20\text{M}$
- Mid-scale Research Infrastructure-2 (MsRI-2) ~~[NSF 21-537](#)~~
  - Total request:  $\$20\text{M} - \$100\text{M}$
  - “Shovel ready”
- Solicitations published in alternate years; next publication in FY23
- Solicitation scope: NSF-wide



# NSF Mid-scale RI-2 Awards (from FY19 cycle)

## High Magnetic Field Beamline (HMF) 1946998



Dedicated High Magnetic Field (HMF) X-ray Beamline at the Cornell High Energy Synchrotron Source (CHESS): The world's highest magnetic field (20 T) at a synchrotron facility will enable new science in broad in materials, chemistry, engineering and biology.

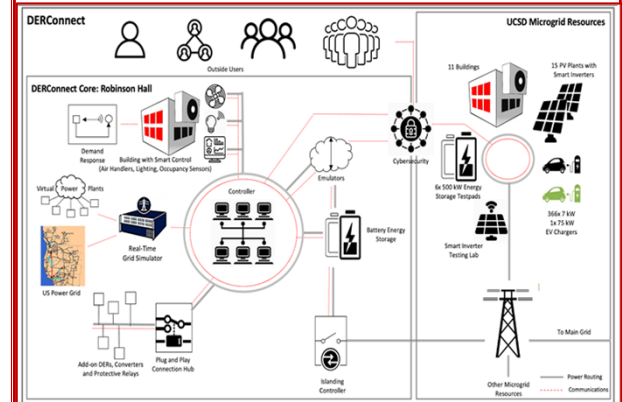
## Global Ocean Biogeochemistry Array (GO-BGC) 1946578



Network of 500 robotic floats into the Global ocean to collect chemistry and biology data from the surface down to a depth of 2000m.

## Grid-Connected Testing Infrastructure for Networked Control of Distributed Energy Resources

(DERConnect) 1947050



Unique, open-access assets with potential to advance the integration of renewables and distributed energy resources into the power grids of the future.





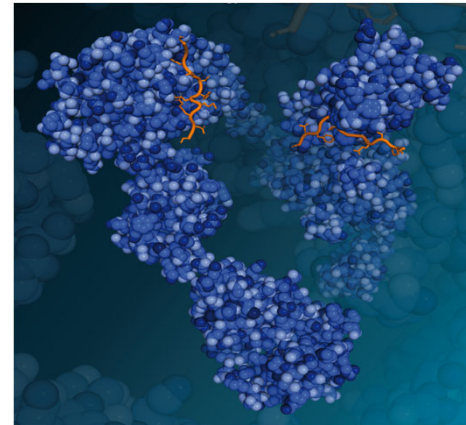
# NSF Mid-scale RI-2 Awards (from FY19 cycle)

## Research Data Ecosystem (RDE) 1946932



A comprehensive data infrastructure for the entire research lifecycle, RDE supports the discovery, preservation, analysis, re-use, and interoperability of data in the social, behavioral, and economic sciences.

## Network For Advanced NMR (NAN) 1946970



An integrated network of more than 20 NMR instruments, including two 1.1GHz systems and a shared cyberinfrastructure to support data analysis, preservation and dissemination will enable the broader research community and democratize access to high-field NMR systems.







# Key Elements of Project Management

Three 90-minute webinars broadcast on zoom with Q&A sessions

- February 28th, 2023 Part I
  - Mid-scale Project Planning & Management
- March 28th, 2023 Part II
  - Mid-scale Project Development, Definition and Risk
- April 25th, 2023 Part III
  - Mid-scale Project Performance Management
- Registration is Open: <https://researchinfrastructureoutreach.com/>





# MPS Workshop for Junior Investigators

- June 4 – 6, 2023 in person @ Westin Alexandria Old Town
- Goals:
  - to provide prospective Principal Investigators with valuable information and advice on the policies, procedures, and opportunities available at NSF
  - to train a pool of future reviewers and encourage volunteering to review individual proposal/s or serve on review panel/s
- Funding is available
- Registration link: <https://reg.conferences.dce.ufl.edu/Physics/Register>
- **Registration deadline: March 20, 2023**





# NSF/MPS/PHY Personnel

- Sethuraman Panchanathan – Director
- Sean L. Jones – Assistant Director for MPS
- Denise Caldwell – Physics Division Director
- Jean Cottam Alan – Deputy Division Director
- Bogdan Mihaila – Nuclear Theory Program Director
- ★ Alfredo Galindo-Uribarri – Expt'l Nuclear Physics Program Director
- Allena Opper – Expt'l Nuclear Physics Program Director



<https://beta.nsf.gov/careers/openings/mps/phy/phy-21-001>  
[www.nsf.gov/careers/rotator](http://www.nsf.gov/careers/rotator)





For the latest updates:  
<https://www.nsf.gov/physics>

Contact us at:

- Bogdan Mihaila  
[bmihaila@nsf.gov](mailto:bmihaila@nsf.gov) or  
call (703)292-8235
- Alfredo Galindo-Uribarri  
[agalindo@nsf.gov](mailto:agalindo@nsf.gov) or  
call (703)292-5139
- Allena Oppen  
[aopper@nsf.gov](mailto:aopper@nsf.gov) or  
call (703)292-8958

The screenshot shows the NSF Directorate for Mathematical & Physical Sciences (MPS) website. The top navigation bar includes links for HOME, FUNDING, AWARDS, DISCOVERIES, NEWS, PUBLICATIONS, STATISTICS, ABOUT NSF, and FASTLANE. The main header features the NSF logo and the text "National Science Foundation Directorate for Mathematical & Physical Sciences (MPS)". A search bar is located on the right. Below the header, a secondary navigation bar lists "MPS HOME", "MPS FUNDING", "MPS AWARDS", "MPS DISCOVERIES", "MPS NEWS", and "ABOUT MPS". The main content area is titled "Physics (PHY)" and includes a sidebar with links for "PHY Home", "About PHY", "Funding Opportunities", "Awards", "News", "Events", "Discoveries", "Publications", "Career Opportunities", "Facilities and Centers", "PHY Program Director Jobs", "See Additional PHY Resources", and "View PHY Staff". A search box for "PHY Staff" is also present. The main content area features three news items: "PHY Replaces DCL with Solicitation NSF 14-576", "PHY Int'l Activities - Potential Co-Review", and "Special Announcements" which includes "MPS Alliances for Graduate Education and the Professoriate - Graduate Research Supplements (AGEP-GRS) Dear Colleague Letter (NSF 13-071)" and "Dear Colleague Letter - Announcement of Instrumentation Fund to Provide Mid-Scale Instrumentation for FY2014 Awards in Physics Division (NSF 13-118)".

