

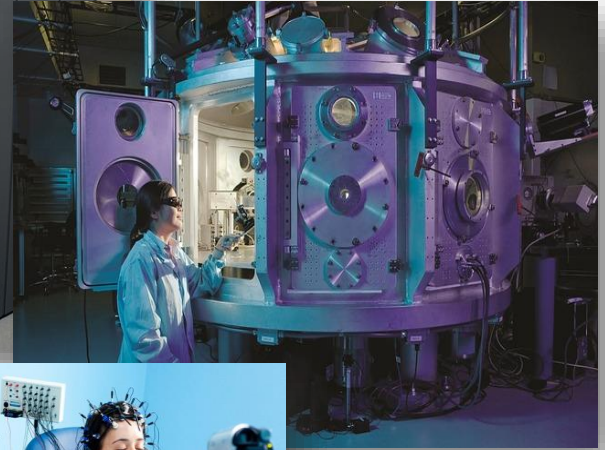
# Funding Focus: The NSF's Major Research Instrumentation (MRI) Program



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# Session Overview

- NSF MRI: What is it?
- Proposal structure/contents
- Avoiding pitfalls, becoming competitive
- Project/Proposal development strategies
- Questions



# What is the NSF MRI program?

The annual funding program...supports the **acquisition** or **development** of a multi-user research instrument that is, in general, too costly and/or not appropriate for support through other NSF programs, without which advances in fundamental science and engineering research may not otherwise occur.

Additionally, an MRI award is expected to enhance research training of students who will become the next generation of instrument users, designers, and builders.

# Equipment acquisition or development

- **Acquisition**: purchase/upgrade of a generally available, yet sophisticated, instrument with little or no modification and risk
- **Development**: proposals should demonstrate the need for a new or extensively upgraded instrument with new performance, enabling enhanced or potentially transformative research opportunities, open up new areas of research and research training and/or have potential as a commercial product

# Single-piece instrument or multiple pieces?

- **An MRI proposal applicant may request support for**
  - A single standalone research instrument, or
  - Individual component pieces that, when combined, serve as an integrated research instrument
    - the ensemble of equipment that defines the instrument enables a specific research experiment or type of research experiment to be undertaken; and...
    - separating or removing an element or component of such an integrated instrument would preclude the planned experiments from occurring or succeeding.
    - Okay...so, is my request allowable?

When in doubt about your request, make this a question/talking point with your identified NSF program officer!

# What the MRI program will NOT fund

- **Construction, renovation or modernization of rooms, buildings or research facilities.**
- **Large, specialized experimental facilities.**
- **General purpose and supporting equipment; this category includes (but is not limited to) general purpose ancillary computers or laboratory instruments.**
- **Sustaining infrastructure and/or building systems.**
- **General-purpose platforms or environment.**
- **Instrumentation used primarily for science and engineering education courses.**

# NSF MRI Program Tracks

- The MRI program consists of two (2) tracks, and each track is based on the amount of the proposed project:
  - Track 1: for equipment requests starting at \$100,000\* to an upper limit of \$1 million, and
  - Track 2: for equipment requests starting at \$1 million to an upper limit of \$4 million

**\*Non-Ph.D.-granting institutions may submit requests for equipment under Track 1 that cost less than \$100,000.**

# NSF MRI proposal limits per institution

- NSF limits the number of proposals a single institution may participate in (either as the lead applicant or a subaward) to three (3):
  - The institution may submit/participate in up to two (2) Track 1 proposals, and up to one (1) Track 2 proposal.
  - Being an unfunded collaborator (proposed user) on another institution's proposal **DOES NOT** count as part of the 3-proposal limit.



Contact your  
Sponsored Programs  
Office as soon as you  
decide to pursue this  
program!



# 2015 MRI Award Snapshot

## By Institution Type

	Ph.D.	non-Ph.D.	Non-degree	MSI
# reviewed	504 (149 DEV)	292 (27 DEV)	26 (8 DEV)	107 (20 DEV)
\$ Requested	\$390.46 M	\$125.26 M	\$17.17 M	\$61.08 M
Mean request	\$774.72 K	\$428.96 K	\$660.27 K	\$570.81 M
Median request	\$588.95 K	\$338.44 K	\$481.33 K	\$505.11 K
# awards	107 (28 DEV)	54 (4 DEV)	6 (3 DEV)	21 (6 DEV)
NSF \$ awarded	\$74.10 M	\$16.38 M	\$4.05 M	\$12.32 M
MRI \$ awarded	\$55.03 M	\$15.66 M	\$3.49 M	\$9.66 M
Success rate	21.23%	18.49%	23.07%	19.6%
Mean award	\$692.55 K	\$303.39 K	\$675.63 K	\$586.82 K
Median award	\$492.29 K	\$264.76 K	\$522.42 K	\$394.10 K



OFFICE OF INTEGRATIVE ACTIVITIES

### Funding rate by NSF Directorate

Biological Sciences: 13%  
 Computer and Information Sci/Eng: 28%  
 Engineering: 13%  
 Geoscience: 24%  
 Math/Physical Science: 24%  
 Social, Behavioral, Economic Science: 39%

# Recent MRI awards in Wisconsin

## **MRI: Acquisition of a Liquid Chromatography/Mass Spectrometer for Accurate Mass Determination and Complex Mixture Analysis**

Award Number:1429616; Principal Investigator:Patrick Willoughby; Co-Principal Investigator:Colleen Byron, Robert Wallace; Organization:Ripon College;NSF Organization:CHE Start Date:08/01/2014; Award Amount:\$237,383.00

## **MRI: Acquisition of a Confocal Laser Scanning Microscope to Enable Undergraduate Research and Research Training across Disciplines**

Award Number:1428875; Principal Investigator:Elizabeth Glogowski; Co-Principal Investigator:Derek Gingerich, Jamie Lyman Gingerich, Matthew Jewell; Organization:University of Wisconsin-Eau Claire;NSF Organization:DMR Start Date:08/15/2014; Award Amount:\$459,569.00

## **MRI: Acquisition of a Novel Assistive Robot Arm for Collaborative Research in Assistive and Rehabilitation Robotics at a Predominantly Undergraduate Institution**

Award Number:1531700; Principal Investigator:Cheng Liu; Co-Principal Investigator:Cheng Liu, Paul Schwartz, Catherine Anderson, John Lui; Organization:University of Wisconsin-Stout;NSF Organization:CNS Start Date:10/01/2015; Award Amount:\$39,339.00

## **MRI: Acquisition of a Nuclear Magnetic Resonance Spectrometer**

Award Number:1625483; Principal Investigator:Brant Kedrowski; Co-Principal Investigator:William Wacholtz, Sheri Lense; Organization:University of Wisconsin-Oshkosh;NSF Organization:CHE Start Date:09/01/2016; Award Amount:\$355,244.00

## **MRI: Development of a Modern Polar Climate and Weather Automated Observing System**

Award Number:1625904; Principal Investigator:Matthew Lazzara; Co-Principal Investigator:John Cassano, Tristan L'Ecuyer, Mark Kulie; Organization:Madison Area Technical College;NSF Organization:OPP Start Date:09/01/2016; Award Amount:\$603,427.00

## **MRI: Acquisition of an Eye Tracking System**

Award Number:1725508; Principal Investigator:Anthony Barnhart; Co-Principal Investigator:ElisabethLeslie Cameron; Organization:Carthage College;NSF Organization:BCS Start Date:08/01/2017; Award Amount:\$37,190.00

## **MRI: Acquisition of Si(Li) Detectors and Two BGO Compton Suppression Shields for the Development of the La Crosse FIREBALL**

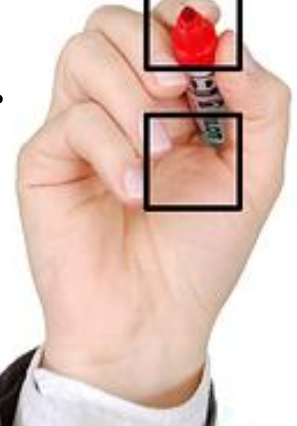
Award Number:1919364; Principal Investigator:Shelly Leshner; Co-Principal Investigator:Ani Aprahamian, Wanpeng Tan; Organization:University of Wisconsin-La Crosse;NSF Organization:PHY Start Date:08/15/2019; Award Amount:\$396,747.00

## **MRI: Acquisition of a High Performance Computing Cluster to Enhance the Undergraduate Discovery Experience**

Award Number:1920220; Principal Investigator:Sudeep Bhattacharyay; Co-Principal Investigator:Ying Ma; Organization:University of Wisconsin-Eau Claire;NSF Organization:CNS Start Date:10/01/2019; Award Amount:\$350,000.00

# The proposal

- Complete proposal preparation should reflect guidance from both the MRI Request for Proposals (RFP) and the latest version of the NSF Proposal & Award Policies & Procedures Guide (PAPPG).
- It is critical to become familiar with both documents; the PAPPG is the basic template guidance for all NSF proposals, and the RFP must be followed for specific proposal section requirements that deviate from the PAPPG guidance.
- The MRI RFP contains a helpful proposal checklist. Keep it handy!



# Project summary and description documents

- **Project summary**
  - One-page limit
  - Contains three sections: overview, intellectual merit, broader impacts
- **Project description**
  - 15-page limit
  - Contents guidance very specific to the RFP, down to the headers, and provides section length suggestions
    - Information about the proposal
    - Research activities to be enabled
    - Description of the research instrument and needs
    - Broader impacts
    - Management plan

# Budget and budget justification

- Non-Ph.D.-granting institutions are not required to commit cost share to the project.
- At least 70% of the requested funds must be found on the equipment line of the budget.
- The Budget Justification, limited to five (5) pages, must include an itemized table of costs per year of the project, or risk Rw/oR.
- All budget items must be well-justified, reflect the scale/complexity of the proposed effort, and explain the calculation process.
- The RFP outlines costs that are eligible and ineligible for support from the MRI program.

# The rest of the proposal...

- **Cover sheet: project title must start with “MRI: Acquisition/Development”**
- **References**
- **Biosketches for the PI, Co-PIs, and Senior Personnel**
- **Current/pending support documents for the PI, Co-PI, and Senior Personnel**
- **Facilities, equipment, and other resources: along with guidance from the PAPPG, list similar and/or related instrumentation at or near the performing organization as “Other Resources”**
- **Data management plan: required, limited to two (2) pages**
- **Postdoctoral mentoring plan (if applicable)**
- **Collaborators and other affiliations (template form)**
- **List of suggested reviewers**

# The rest of the proposal...cont'd

- **Special information and supplementary documents**
  - Letter of classification of eligible institution (prescribed language only, on letterhead, completed by OSP)
  - Letter of commitment from the institution pledging to continue operations and maintenance of the equipment over the expected life of the instrument
  - Equipment quote from vendor
  - Letters from collaborators acknowledging projected use of the instrument
  - Other attachments as applicable to the project

# The first hurdle: Avoiding Rw/oR\*

- **Proposals will be “Returned wo/ Review” if any of the following missteps are taken:**
  - Activities that fall outside the scope of either the MRI program or NSF overall;
  - All proposals submitted beyond the institution’s limit, as described earlier;
  - Proposal budgets outside the allowable limits of the MRI program;
  - Proposals that do not contain Results from Prior MRI Support;
  - Proposals that do not contain **REQUIRED** supplemental documents;
  - Proposals in which the Management Plan is absent from the Project Description.
  - Don’t forget: the proposal checklist contained in the RFP can help you avoid these errors!

\*List adapted from an NSF-provided presentation.



# The second hurdle: Avoiding basic project weaknesses\*

- **Proposals will likely fail during review if they suffer from the following weaknesses:**
  - Lack of institutional commitment to the project;
  - WEAK management plan;
  - Lack of shared-use need for the requested equipment, within and among institutions;
  - Requested equipment is already reasonably accessible;
  - The budget is miss-matched to the proposed scope of work;
  - Failure to address the potential for research training, especially among groups underrepresented in STEM.

\*List adapted from an NSF-provided presentation.

# Becoming competitive\*

- **Keep the following in mind when crafting your proposal:**
  - Effectively address the Intellectual Merit and Broader Impacts; check out (NABI) <https://broaderimpacts.net/> for guidance!
  - The compelling research/research training should drive the request for the proposed equipment, not simply the purchase itself...describe the research work with enthusiasm!
  - How will your activities meaningfully contribute to the discipline, and across disciplines, in research and research training?
  - The MRI program is meant to build institutional capacity; connect your proposed effort to the mission of the department/college/institution.
  - The equipment: ask for what you need; no more, no less. Make sure the desired “bells and whistles” are necessary, if requested.
  - Craft a strong management plan for instrumentation use and maintenance, which reflects a constant use schedule and strategic downtime for the unit.

\*Compiled from an NSF presentation, web-located awardee anecdotal information.

# Sample project summaries - Overview

**Overview:** XX requests funds to acquire equipment to significantly upgrade and enhance our Electronic Laboratory for Science and Analysis (ELSA) cluster. ELSA is a heterogeneous High Performance Computing (HPC) cluster housed in a dedicated HPC Center in our new STEM Building. In order to maintain a diverse and state-of-the-art resource that will continue to meet the current and future computational research needs of XXs expert science faculty and undergraduate students, ELSA requires several targeted enhancements. The funding requested here will help us achieve four main goals: (1) Triple the number of GPU servers available in the ELSA cluster, to meet the intensive GPU computing demands of several research groups and avoid large wait times; (2) Decommission ELSA's 9 year-old, end-of-life CPU servers that are currently limiting many of our research programs, and replace them with fast CPUs with high-speed interconnects; (3) Expand ELSA's storage space to meet our long-term scientific data archival needs; and (4) Acquire dedicated hardware and software to enable remote visualization and minimize large data transfers across our science network. Collectively, these enhancements will directly benefit the research of 13 of XX's faculty members and their groups, elevating their high-impact science to new heights. In addition to improving our capacity for scientific discovery, the proposed upgrades will help XX meet the demands of developing an undergraduate workforce that is ready to leverage the increasingly powerful HPC resources of the future in their research at XX and beyond.

**Overview:** This MRI proposal requests funds for the acquisition of a Tescan VEGA3 XMU SEM system for use in research and teaching at XX, a primarily undergraduate institution. This microscope will be integrated immediately into the research and teaching programs of multiple faculty members [7], and it will fill a very noticeable void in the research equipment at XX. We have a multidisciplinary group of faculty that are actively involved in student mentoring from the departments of geology, chemistry, biological sciences, and anthropology. The SEM-EDS system will also be integrated in the training of undergraduate and graduate students that are part of our Research Inspiring Student (RISE) program, giving them important experience with a common set of observational and analytical tools. Lastly, the SEM-EDS system will be used in a cooperative outreach program to help bring meaningful scientific experiences to primary and secondary classrooms in rural STATE.

# Proposal development strategy: start early!

- The NSF MRI program maintains an annual deadline in January. **Next deadline: January 1-19, 2020**
- Use the time ahead of the deadline to do your homework/research.
- Discuss your project with a NSF program officer
- The proposal requires a bit of input from others beyond the PI; start early so that you can retrieve what you need from them!
- Submit early! If you submit ahead of the deadline, you can always revise and resubmit (ahead of the deadline) to correct an error/omission!

# Proposal development strategy: research!

- **Research Equipment**

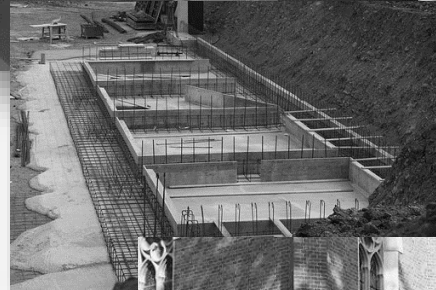
- Accessible? Schedule?
- Functional?
- Current?
- Vendors/Models/Cost?

- **Other Research Users**

- Within the home department?
- Within the college?
- Across campus?
- Other organizations?

- **Housing/Maintenance**

- Location for equipment?
- Expertise for running/maintaining?
- Cost of maintenance when the MRI award expires?



# Proposal development strategy: research!

- **What instrumentation has been funded by the MRI program in recent years, and who are the awardees?**
- **What do the pieces and parts of a successful MRI proposal look like?**
- **To which NSF division/directorate should I send our proposal?**

# Presentation takeaways

- Purpose: instrumentation for conducting NSF-supported **research**, and enhancing **research training** for students
- Multi-user, shared use equipment
- The intended, novel, transformative research described in the proposal drives the instrumentation request
- Inclusion of a strong management plan for use and maintenance
- Demonstrate meaningful evidence of institutional commitment to maintaining the requested equipment
- Limited submission opportunity
- Connect with a program officer!



# Links to NSF MRI resource information

- Link to the Request for Proposals:  
[https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf18513](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf18513)
- Link to the Program's Frequently Asked Questions:  
[https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf15012](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf15012)
- Recent Awards List:  
<https://www.nsf.gov/awardsearch/advancedSearchResult?ProgEleCode=1189&BooleanElement=ANY&BooleanRef=ANY&ActiveAwards=true&#results>
- Link to the Proposal & Award Policies & Procedures Guide:  
[https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=pa\\_ppg](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pa_ppg)



# Audience questions?



# Webinar Topics for AY 2019-20

- Funding Opportunities for Your Teaching, Research, and Scholarship, October 3
- Funding Focus: The National Science Foundation's Major Research Instrumentation (MRI) Program, October 9
- Budget Building Fundamentals, **November 7**
- The Timeline From Great Idea to Project Execution, **November 13**
- Analyzing RFPs for Sponsor Hot Buttons, **December 5**
- Searching for Non-Federal Grant Funding, **February 6**
- Funding Focus: The National Science Foundation's Faculty Early Career Development Program (CAREER), **February 12**
- Improving Your Odds for Success, Even before Writing Your Application, **March 5**
- Common Grant Writing Pitfalls, **March 11**
- Goals, Objectives and Outcomes: The "GOO" that Holds a Proposal Together, **April 2**

To see full session descriptions and register online, go to <https://www.wisys.org/grants/webinars>