

# Instrumentation: Federal Grants and Programs for the Life Sciences



**FASEB**

Federation of American Societies  
for Experimental Biology

FASEB Shared Research Resources Subcommittee  
Updated: April 25, 2018

## FASEB Shared Research Resources Subcommittee

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## Introduction

To conduct cutting-edge research, investigators require access to advanced scientific equipment. Federal research agencies sponsor many different types of grants and programs to support the purchase and maintenance of critical instrumentation that is beyond the budget of a typical research grant. Many of these grant mechanisms focus on multi-user configurations – from shared equipment to user and core facilities. This approach can extend the value of research funding and broaden access to the resource. Other agency programs support the development and increased availability of new technologies, expanding scientific opportunities. This document provides a brief overview of programs that increase researcher access to advanced instrumentation.

## Table of Contents

Shared Instrumentation Grants (Table) .....	2
Instrumentation Development Programs (Table) .....	4
Instrumentation Awards for Underrepresented Institutions (Table) .....	6
Second-hand Instrumentation Programs (List) .....	7
Resources to Locate User and Core Facilities (List) .....	7
Suggested Best Practices for Developing a Shared Instrumentation Proposal ....	8

# Shared Instrumentation Grants

*These grant programs support acquisition of equipment that will be used by multiple investigators, building the research capability and capacity at awarded sites.*

	National Institutes of Health (NIH)			Dept. of Defense (DOD)
<b>Grant/Program</b> (click on name to visit the website)	<a href="#">S10 Instrumentation Grant Programs</a>			<a href="#">Defense University Research Instrumentation Program (DURIP)</a>
	Shared Instrumentation Grants (SIG)	High-End Instrumentation (HEI)	Shared Instrumentation for Animal Research (SIFAR)*	
<b>FY 2017 funding data</b>	Awards: 87 Funding: \$36M  <a href="#">List of recent awards</a>	Awards: 27 Funding: \$33M	Planned awards: 12 Planned funding: \$6M	Awards: 160 Funding: \$47M  <a href="#">List of recent awards</a>
<b>Equipment price range</b>	\$50K to \$600K	\$600K to \$2M	\$50K to \$750K	\$50K to \$1.5M
<b>Eligibility</b>	<b>Institution:</b> Domestic public or non-profit <b>Number of Applications:</b> No limits, but similar S10 applications from the same institution must be accompanied by documentation from a high level institutional official stating that this is not an unintended duplication, but part of a campus-wide instrumentation plan			<b>Institution:</b> Domestic higher education with STEM degree programs <b>Number of Applications:</b> No limit
<b>Bundling of equipment</b>	Not allowed		Permitted if configured as a specialized integrated system or to support a workflow	Permitted if all items comprise a "system" that is used for a common research purpose
<b>Cost sharing</b>	Not required; however, "commitment of an appropriate level of institutional support, to ensure the associated sustaining infrastructure, is expected and should be described"			Not required, not an evaluation factor
<b>Support for service contracts</b>	No			No
<b>Other requirements/information</b>	Applicant institution must include in its S10 application a table documenting the status and use of all SIG, HEI, and SIFAR instruments funded within the last five years  A major user group of at least three NIH-funded investigators should account for at least 35% of Accessible User Time (AUT); NIH-supported projects should collectively require 75% of AUT			The instrumentation requested must support research in technical areas of interest to the DoD  Applicants may submit a single DURIP application to one or more of the three funding agencies

\*New funding program

## Shared Instrumentation Grants (cont.)

National Science Foundation (NSF)		US Dept. of Veterans Affairs (VA)	
<u>Major Research Instrumentation Program (MRI): Acquisition</u>	<u>Improvements in Facilities, Communications, and Equipment at Biological Field Stations and Marine Laboratories (FSML)</u>	<u>ORD Shared Equipment Programs</u>	
		Shared Equipment Evaluation Program (ShEEP)	Laboratory Animal Major Equipment (LAMB)
<b>Planned awards:</b> 150 <b>Planned funding:</b> \$75M <i>(totals reflect acquisition and development funding)</i> <a href="#">List of recent awards</a>	<b>Planned awards:</b> 20 to 25 <b>Planned funding:</b> \$4.2M <a href="#">List of recent awards</a>	<b>Awards:</b> 21, including 3 through the new Imaging Core (ShEEP-IC) track <a href="#">List of recent awards</a>	<b>Awards:</b> 9
Track 1: \$100K to \$1M† Track 2: \$1M to \$4M	Planning grants: up to \$25K Vessels: up to \$150K	ShEEP and LAMB: \$75K to \$600K ShEEP-IC: acquisition of imaging systems, up to \$2.5M each, for human subjects research	
<b>Institution:</b> Domestic higher education, non-profit, and consortia <b>Number of Applications:</b> Three per institution per application cycle (up to two in Track 1 and one in Track 2)	<b>Institution:</b> Domestic higher education and select non-profit <b>Number of Applications:</b> One per facility per application cycle	<b>Institution:</b> VA research stations (intramural) <b>Applicant:</b> VA investigators	
Permitted if all items are necessary to assemble the instrument and are well-integrated	Permitted, but applications should focus on major, shared-use items	Not allowed	
Precisely 30 percent cost-sharing is required, except for non-PhD-granting higher education institutions	Prohibited	Not required	
Yes. Budgets may include installation, maintenance, and technical support costs; however, at least 70 percent of costs must be for equipment	No	No	
Applicant institution must submit a letter listing the status of all MRI-funded instruments obtained within the last five years  NSF aims to support development proposals in numbers consistent with recent competitions (up to one-third of MRI awards)	This program is limited to off-campus research and training facilities	ShEEP awards are intended to build research station capacity and capability	LAMB awards aim to update animal facilities to maintain compliance

† Lower amounts allowed for select disciplines and institutions

# Instrumentation Development Programs

To ensure continued access to cutting-edge instrumentation, federal programs support the full range of equipment development, from proof-of-concept to bringing prototypes to market.

	National Institutes of Health (NIH)		
<b>Grant/Program</b> (click on name to visit the website)	<a href="#">Biomedical Technology Resource (BTRR/BTRC) Programs (P41)</a>	<a href="#">Exploratory Research for Technology Development (R21)*</a>	<a href="#">Focused Technology Research and Development (R01)*</a>
<b>FY 2017 funding data</b>	<b>Awards:</b> 78 <b>Funding:</b> \$110M <i>(all active awards)</i> <a href="#">List of recent awards</a>	<b>Awards:</b> 3 <b>Funding:</b> \$550K <a href="#">List of recent awards</a>	<b>Awards:</b> 5 <b>Funding:</b> \$2M <a href="#">List of recent awards</a>
<b>Eligibility</b>	<b>Institution:</b> Domestic higher education, non-profit, for-profit, and governmental organizations		
<b>Cost sharing</b>	Not required		
<b>Other requirements/information</b>	In addition to developing technologies and instrumentation, BTRR/BTRCs must also provide access to the resources or technology, train outside investigators, and disseminate resulting technology	See the <a href="#">NIGMS decision tree</a> for determining which development program is appropriate  This program supports high risk, preliminary research that, if successful, should lead to proof-of-concept: a preliminary demonstration of feasibility	
		This program supports innovative research and development, focused on addressing technical challenges that stand in the way of creating an effective research tool	

\*New funding program

## Instrumentation Development Programs (cont.)

National Science Foundation (NSF)		Multiple Agencies
<a href="#"><u>Major Research Instrumentation Program (MRI): Development</u></a>	<a href="#"><u>Instrument Development for Biological Research (IDBR)</u></a> <i>(on hiatus, no longer receiving proposals)</i>	<a href="#"><u>Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR)</u></a>
See MRI: Acquisition on <a href="#"><u>page 3</u></a>	N/A  <a href="#"><u>List of past awards</u></a>	Awards: ~5,200 Funding: ~\$2B  <a href="#"><u>List of recent awards</u></a>
<b>Institution:</b> Domestic higher education, non-profit organizations and consortia	<b>Institution:</b> Domestic higher education, non-profit organizations and consortia	<b>Institution:</b> For-profit businesses with no more than 500 employees
Precisely 30 percent cost-sharing is required, except for non-PhD-granting institutions of higher education	Prohibited	Generally allowed, but select funding agencies may prohibit it
Applicant institution must submit a letter listing the status of all MRI-funded instruments obtained within the last five years  NSF aims to support development proposals in numbers consistent with recent competitions (up to one-third of awards)	Applicants must select one of two tracks: "Innovation" (developing novel instruments) or "Bridging" (making prototypes or high-end equipment broadly available)  Many categories of health/medical-instrumentation development are not supported	For STTR awards, at least 40 percent of the supported work must be performed at the small business and at least 30 percent at the partnering research institution

# Instrumentation Awards for Underrepresented Institutions

Federal agencies sponsor a variety of programs to build research capacity at underrepresented institutions and in regions that have historically had limited success obtaining research grants.

	US Dept. of Agriculture (USDA)	Dept. of Defense (DOD)
<b>Grant/Program</b> (click on name to visit the website)	<a href="#"><u>Food and Agricultural Science Enhancement (FASE) Strengthening Awards: Equipment Grants</u></a>	<a href="#"><u>Research and Education Program for Historically Black Colleges and Universities and Minority-Serving Institutions (HBCU/MI): Equipment/Instrumentation Grants</u></a> <i>(program announcement last issued for FY 2017 award cycle)</i>
<b>Equipment price range</b>	\$10K to \$250K	\$100K to \$600K
<b>Eligibility</b>	<b>Institution:</b> Select underrepresented institutions as determined by factors such as size, past funding levels, student demographics, and USDA EPSCoR eligibility (for details, see this <a href="#"><u>flow chart</u></a> )	<b>Institution:</b> Domestic historically black colleges and universities and minority-serving institutions
<b>Bundling of equipment</b>	Not allowed	Permitted if all items of equipment comprise a “system”
<b>Cost sharing</b>	Yes. A non-federal match is required and the amount requested “shall not exceed 50 percent of the cost or \$50,000, whichever is less.” A waiver may be available in select situations	Not required, not an evaluation factor
<b>Support for service contracts</b>	No	No
<b>Other requirements/ information</b>	There is no dedicated RFA for this program. Applicants should submit to the relevant topical RFA and indicate FASE eligibility  Each year 11.25% of AFRI grant funding is allocated for strengthening grants, which include this equipment program	Institutions are limited to three applications per award cycle  Applications must describe how the instrumentation will impact student participation in research



## Second-hand Instrumentation Programs

*These programs facilitate the transfer of excess research equipment to laboratories that need them.*

- The [Laboratory Equipment Donation Program \(LEDP\)](#) offers used Department of Energy equipment for research and teaching purposes at US institutions of higher education and select types of research organizations.
- The [Research Equipment Quick Use Initiative Program \(REQUIP\)](#) provides an established process to transfer instrumentation between US Department of Veteran's Affairs research stations. Available equipment is listed on a dedicated online portal.

## User and Core Facilities

*Agencies also provide access to advanced instrumentation through facilities, including equipment that can only be cost-effectively deployed at a regional or national level. These facilities typically specialize in specific techniques or technologies. They are frequently staffed by dedicated scientists, who facilitate use and often play an important role in technological development.*

- **Department of Energy (DOE) User Facilities:** DOE Office of Science operates [user facilities](#) around the country. The following three are supported by the Biological and Environmental Research program: [Atmospheric Radiation Measurement Climate Research Facility \(ARM\)](#); [Environmental Molecular Sciences Laboratory \(EMSL\)](#); and [Joint Genome Institute \(JGI\)](#). Other DOE sites include synchrotron radiation facilities, which are frequently used by structural biologists. Access is determined by merit review of the research proposal, and fees are waived for investigators engaging in non-proprietary research that they intend to publish.
- **National Science Foundation (NSF) Supported Facilities:** NSF provides funding for a variety of research [user facilities](#). Through the Major Research Equipment and Facilities Construction (MREFC) account, NSF also supports the creation of new facilities. Currently, the BIO-associated program, [National Ecological Observatory Network \(NEON\)](#), is making its assignable assets available for research and education as it transitions out of its construction phase.
- **Core Facilities:** There is no comprehensive list of facilities, but the following two databases are the most extensive resources available: [ABRF Core MarketPlace](#) and [eagle-i](#)
- **Biomedical Technology Resource (BTR) Centers:** The NIH-funded BTR Centers are directed to provide access and technological assistance to the NIH-supported research community. The [BTR portal](#) includes a list of BTR Centers organized by research field and technology.
- **Stock Centers and Living Collections:** The FASEB [Database of US Providers of Research Organisms](#) lists over 130 providers spanning the academic, nonprofit, government, and commercial sectors. These entities offer access to organisms for scientific research, collectively covering all domains and kingdoms.
- **NIH Clinical Center:** The Center welcomes collaborative projects with the research community and, through these activities, provides access to a range of advanced [equipment and technologies](#).
- **Center for Inherited Disease Research (CIDR):** This NIH-supported center provides genetic research services. Access is granted through a non-monetary NIH award (X01).

## Suggested Best Practices for Developing a Shared Instrumentation Proposal

*To maximize the impact of limited funds for shared instrumentation, sponsors generally seek proposals that have the potential to enhance or enable multiple research projects and that demonstrate capability to effectively use of the instrument throughout its lifespan.*

Compelling applications communicate the potential return-on-investment for the instrument and institutional preparedness. When developing a proposal, consider how to address each of the following items (a few may not be applicable, but most should be relevant):

- **Justification of need:** Most importantly, proposals should clearly articulate why the instrument is needed and what research projects it would enable. In addition, this justification should explain why the proposed site is an appropriate – or optimal – place to locate the instrument. Applicants can utilize many types of supporting data to document need, including institutional surveys of investigators, facility use trends, and specific aims listed in potential users' research grant applications.
- **Broader impacts:** If the instrument will be made accessible to researchers at other institutions or for-profit companies, those plans should be listed in the proposal.
- **Instrument selection:** In addition to justifying a resource need, applications should demonstrate careful consideration of which instrument would best meet that documented need. Inclusion of pilot data, thorough comparison of instrument models, and assessment of vendor options is highly valued.
- **Technical expertise and development opportunities:** Applications should demonstrate that the institution has knowledgeable and skilled scientists that can ensure the acquired instrument will be well-used throughout its lifespan. This includes providing facility personnel ongoing opportunities to learn new practices and methodologies (such as through attendance at scientific conferences and workshops) and extends to training the next generation of scientists. Cross-training personnel and succession plans further demonstrate a commitment to securing technical expertise.
- **Source(s) of support for maintenance and repair:** Maximizing the useful lifespan of an instrument requires a long-term commitment to maintenance and repair. Applicants should describe what strategies will be used – such as self-insurance or service contracts – and the source(s) of funding for those expenditures. In some cases, planning for future upgrades also may be appropriate.
- **Letter(s) of support from a high-level institutional official:** A strong letter states how acquisition will benefit the institution's research portfolio, commits to space and all infrastructure changes that are needed for installation of the instrument, and addresses data management. If applicable, it also should convey how this purchase aligns with the institution's strategic plan for research capability and infrastructure.
- **Potential for methodology or technology development:** If relevant, applications should note any facility plans for protocol development and for any novel or pioneering applications of the technology.

***Disclaimer:** Please note that support for instrumentation is limited, and not all meritorious grant applications will be awarded funding. These suggested best practices are intended to help investigators strengthen their proposals, but cannot guarantee success.*