

# NSF General PI Meeting

Jim Shank presenting for

NSF Participants @ Snowmass:

Denise Caldwell, Division Director, PHY

PHY Program Directors: Keith Dienes, Darren Grant, Jim Shank,

William Wester

National Science Foundation

Division of Physics

Snowmass Community Summer Study, Seattle, July 20, 2022



# Overview

- NSF Organization
- Presidents Budget Requests 2023
- Historical perspective of MPS funding
- Updates on:
  - EPP Theory(w PA/Cosmology) and Exp.
  - PA Underground and Cosmic
- Funding Opportunities



# Division of Physics – Core Research Programs

## Atomic, Molecular, & Optical Physics

Experiment: John Gillaspy; Kevin Jones,  
Theory: Robert Forrey

## Plasma Physics

Slava Lukin, Jose Lopez

## Elementary Particle Physics

Experiment: Jim Shank + 1  
Theory: Keith Dienes

## Particle Astrophysics

Experiment: Darren Grant, William Wester  
Theory (+cosmology): Keith Dienes

## Gravitational Physics + LIGO research

Pedro Marronetti

## Nuclear Physics

Experiment: Allena Opper;  
Alfredo Galindo-Uribarri  
Theory: Bogdan Mihaila

## Physics of Living Systems

Krstan Blagoev

## Quantum Information Science

Alex Cronin;

## Newest faces:

Alfredo Galindo-Uribarri  
Darren Grant  
Jose Lopez  
William Wester

Physics at the Information Frontier  
Bogdan Mihaila

Integrative Activities in Physics  
(REU Sites, MRI, CAREER, BP)  
Jose Lopez, Kathy McCloud

Physics Frontiers Centers  
Jim Shank Kathy McCloud

Large Facilities  
Mark Coles



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# FY2023 President's Request

## NATIONAL SCIENCE FOUNDATION SUMMARY TABLE FY 2023 BUDGET REQUEST TO CONGRESS (Dollars in Millions)

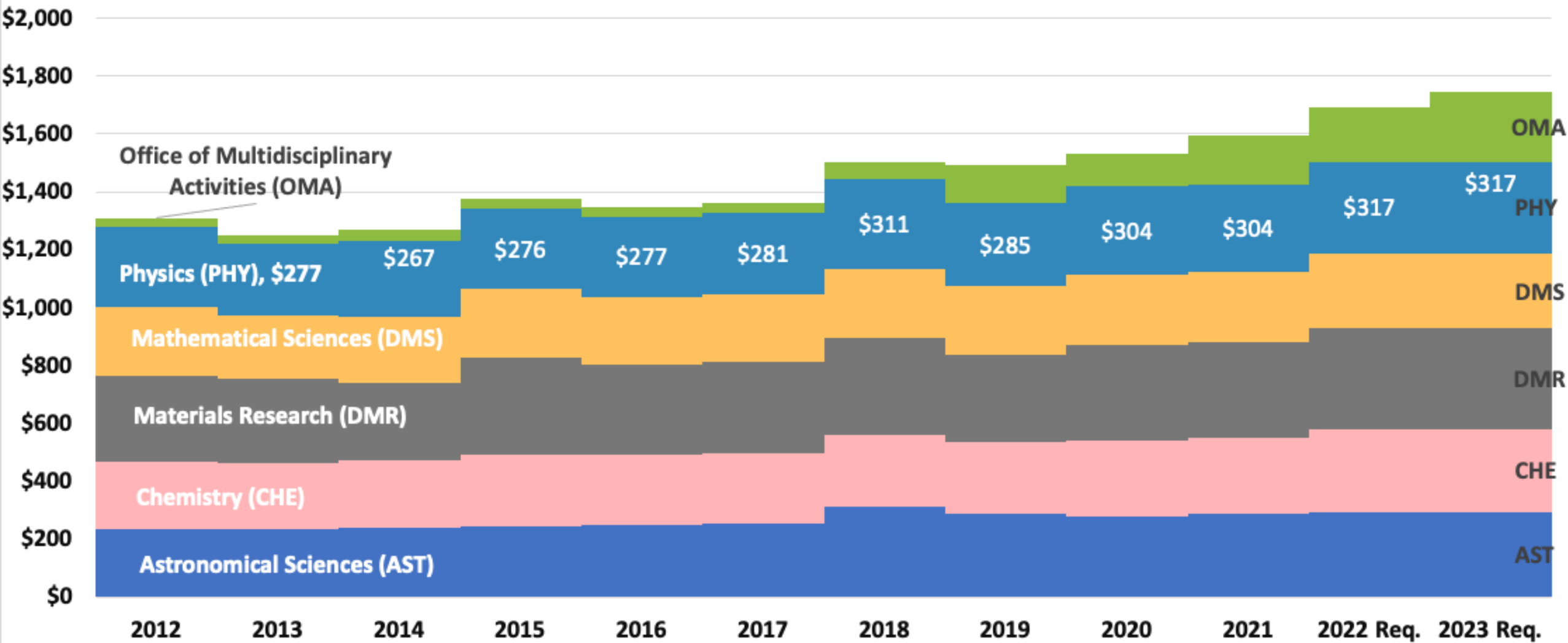
NSF by Account	FY 2021				FY 2023 Request change over:				
	FY 2021	ARP	FY 2022	FY 2023	FY 2021 Actual		FY 2022 Enacted		
	Actual	Actual	Enacted <sup>1</sup>	Request	Amount	t	Amount	nt	
BIO	\$817.74	\$9.18		\$970.23	\$152.49	18.6%	N/A	N/A	
CISE	1,007.13	35.72		1,150.78	143.65	14.3%	N/A	N/A	
ENG	764.43	3.00		940.28	175.85	23.0%	N/A	N/A	
GEO	1,004.27	71.04		1,239.05	234.78	23.4%	N/A	N/A	
<b>MPS</b>	<b>1,593.31</b>	<b>20.33</b>		<b>1,746.847</b>	<b>153.54</b>	<b>9.6%</b>	N/A	N/A	
SBE	282.11	18.16		330.21	48.10	17.0%	N/A	N/A	
TIP <sup>4</sup>	369.01	19.87		879.87	510.86	138.4%	N/A	N/A	
<i>TIP Programs</i>	<i>136.73</i>	<i>2.00</i>		<i>596.81</i>	<i>460.08</i>	<i>336.5%</i>	<i>N/A</i>	<i>N/A</i>	
<i>SBIR/STTR, including Operations</i>	<i>232.28</i>	<i>17.87</i>		<i>283.06</i>	<i>50.78</i>	<i>21.9%</i>	<i>N/A</i>	<i>N/A</i>	
OISE	51.29	1.45		74.04	22.75	44.4%	N/A	N/A	
OPP	484.04	14.52		547.10	63.06	13.0%	N/A	N/A	
IA <sup>3</sup>	386.42	2.28		545.86	159.44	41.3%	N/A	N/A	
U.S. Arctic Research Commission	1.60	-		1.72	0.12	7.5%	N/A	N/A	
<b>Research &amp; Related Activities</b>	<b>\$6,761.35</b>	<b>\$195.54</b>	<b>\$7,159.40</b>	<b>\$8,425.987</b>	<b>\$1,664.63</b>	<b>24.6%</b>	<b>\$1,266.59</b>	<b>17.7%</b>	
<b>STEM Education<sup>3,4</sup></b>	<b>\$1,110.85</b>	<b>\$23.99</b>	<b>\$1,006.00</b>	<b>\$1,377.18</b>	<b>\$266.33</b>	<b>24.0%</b>	<b>\$371.18</b>	<b>36.9%</b>	
<b>Major Research Equipment &amp; Facilities Construction</b>	<b>\$161.27</b>	<b>\$8.95</b>	<b>\$249.00</b>	<b>\$187.23</b>	<b>\$25.96</b>	<b>16.1%</b>	<b>-\$61.77</b>	<b>-24.8%</b>	
<b>Agency Operations &amp; Award Management</b>	<b>\$384.52</b>	<b>\$12.00</b>	<b>\$400.00</b>	<b>\$473.20</b>	<b>\$88.68</b>	<b>23.1%</b>	<b>\$73.20</b>	<b>18.3%</b>	
<b>Office of Inspector General</b>	<b>\$17.61</b>	<b>-</b>	<b>\$19.00</b>	<b>\$23.393</b>	<b>\$5.78</b>	<b>32.8%</b>	<b>\$4.39</b>	<b>23.1%</b>	
<b>Office of the National Science Board</b>	<b>\$4.43</b>	<b>-</b>	<b>\$4.60</b>	<b>\$5.09</b>	<b>\$0.66</b>	<b>14.9%</b>	<b>\$0.49</b>	<b>10.7%</b>	
<b>Total, NSF Discretionary Funding</b>	<b>\$8,440.03</b>	<b>\$240.48</b>	<b>\$8,838.00</b>	<b>\$10,492.08</b>	<b>\$2,052.05</b>	<b>24.3%</b>	<b>1654.08</b>	<b>18.7%</b>	
STEM Education - H-1B Visa	146.51	-	162.47	158.86	12.35	8.4%	-3.61	-2.2%	
Donations	25.94	-	10.00	10.00	-15.94	-61.4%	-	-	
<b>Total, NSF Mandatory Funding</b>	<b>\$172.45</b>	<b>-</b>	<b>\$172.47</b>	<b>\$168.86</b>	<b>-\$3.59</b>	<b>-2.1%</b>	<b>-\$3.61</b>	<b>-2.1%</b>	
<b>Total, NSF Budgetary Resources</b>	<b>\$8,612.48</b>	<b>\$240.48</b>	<b>\$9,010.47</b>	<b>\$10,660.94</b>	<b>\$2,048.46</b>	<b>23.8%</b>	<b>\$1,650.47</b>	<b>18.3%</b>	



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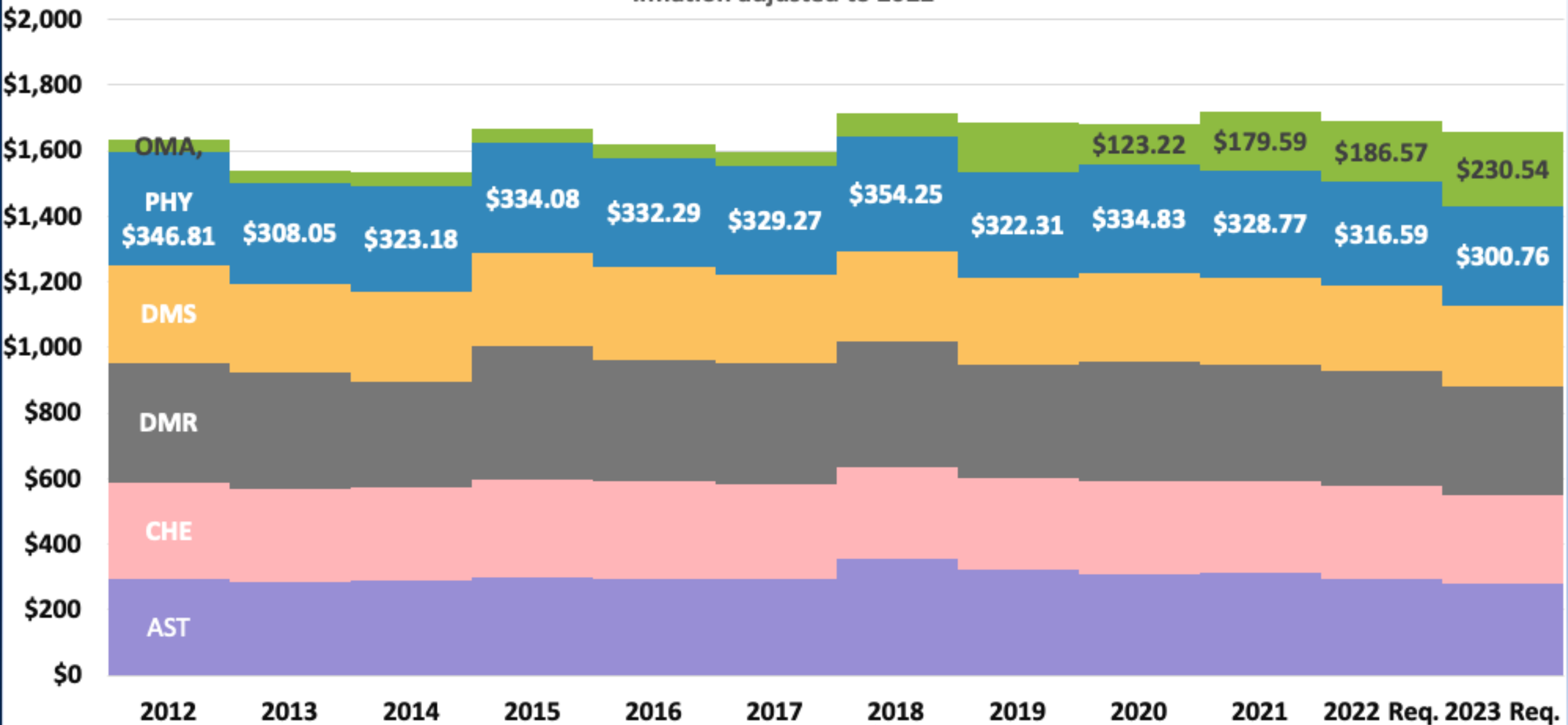
# Directorate of Mathematical and Physical Sciences by Fiscal Year (Actual or Pres. Req.) \$M



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Directorate of Mathematical and Physical Sciences  
by Fiscal Year (Actual or Pres. Req.) \$M  
Inflation adjusted to 2022



FY2023 President's budget request

**PHY Funding**  
(Dollars in Millions)

	FY 2021 Actual	2022 (TBD)	FY 2023 Request	Change over Amount	Percent
<b>Total</b>	<b>\$304.42</b>	<b>-</b>	<b>\$316.59</b>	<b>\$12.17</b>	<b>4.0%</b>
<b>Research</b>	<b>210.56</b>	<b>-</b>	<b>222.84</b>	<b>12.28</b>	<b>5.8%</b>
CAREER	11.99	-	7.30	-4.69	-39.1%
Centers Funding (total)	7.54	-	7.70	0.16	2.1%
Artificial Intelligence Research Insti	2.70	-	2.70	-	-
STC: Center for Bright Beams (PHY)	4.84	-	5.00	0.16	3.3%
<b>Education</b>	<b>5.02</b>	<b>-</b>	<b>4.92</b>	<b>-0.10</b>	<b>-2.0%</b>
<b>Infrastructure</b>	<b>88.84</b>	<b>-</b>	<b>88.83</b>	<b>-0.01</b>	<b>-0.0%</b>
IceCube	3.53	-	3.83	0.30	8.6%
LHC	20.00	-	20.50	0.50	2.5%
LIGO	45.00	-	45.00	-	-
Midscale Research Infrastructure	1.69	-	18.50	16.81	993.4%
NSCL <sup>1</sup>	15.50	-	-	-15.50	-100.0%
Research Resources	2.75	-	1.00	-1.75	-63.7%



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# Major Research Equipment Account

FY2023 President's budget request

## MREFC Account Funding, by Project

(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate <sup>1</sup>	FY 2022 Request	FY 2023 Request	FY 2024 Estimate	FY 2025 Estimate	FY 2026 Estimate	FY 2027 Estimate
Antarctic Infrastructure Recapitalization	\$48.78	\$90.00	\$90.00	\$60.00	\$60.00	TBD	TBD	TBD
DKIST	-	-	-	-	-	-	-	-
HL-LHC Upgrade	33.00	33.00	36.00	33.00	18.00	-	-	-
Mid-scale Research Infrastructure <sup>2</sup>	-	76.25	76.25	76.25	76.25	76.25	76.25	76.25
RCRV	25.00	-	5.00	1.98	-	-	-	-
Vera C. Rubin Observatory	46.35	40.75	40.75	15.00	-	-	-	-
Dedicated Construction Oversight	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
<b>Total</b>	<b>\$154.84</b>	<b>\$241.00</b>	<b>\$249.00</b>	<b>\$187.23</b>	<b>\$155.25</b>	<b>\$77.25</b>	<b>\$77.25</b>	<b>\$77.25</b>



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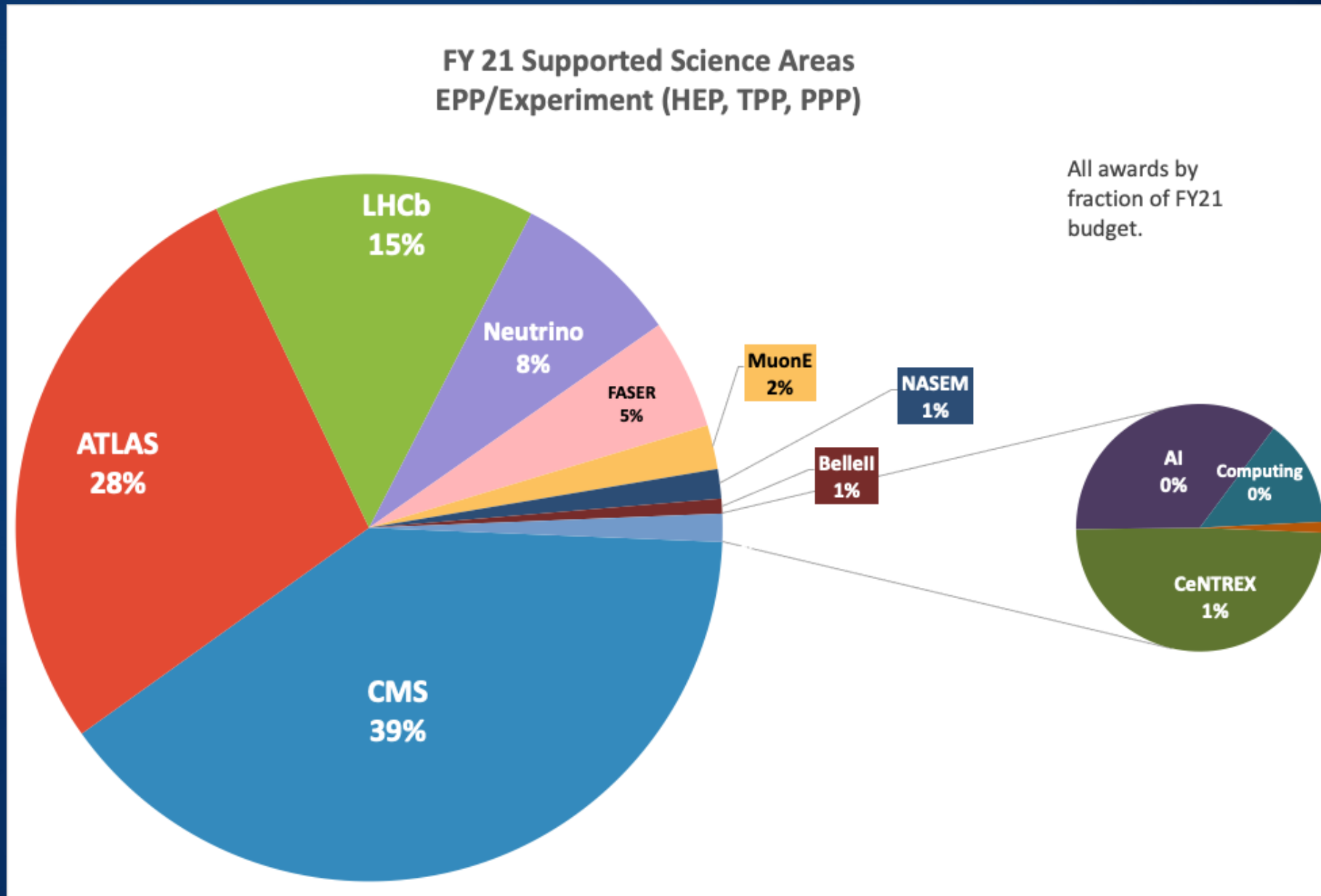
# Experimental EPP Program

- Elementary Particle Physics (EPP) Program, which primarily supports particle physics at accelerators and advances in detector development.
- Range of program coverage:
  - High Energy Physics (ATLAS, CMS,...)
  - Precision Experiments (Neutrinos, LHCb, Rare-K, EDMs, ...), LHCb M&O
  - Tools for Particle Physics (Artificial Intelligence, Instrumentation,...)

Program Director: J. Shank							
EPP Program	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY2021
Awards issued	19	12	7	18	15	15	20
CAREER awards	1	2	1	1	0	3	0



# Full EPP-exp program at the end of 2021



# Theoretical HEP and Particle Astro/Cosmology Programs

- Particle Theory is essential to the success of the entire Particle Physics mission. We support cutting-edge investigator-driven research in two programs:
  - Theoretical High-Energy Physics
  - Theoretical Particle Astrophysics and Cosmology
- Regular interactions with EPP, PA, Gravity Theory, Nuclear Theory, Astronomy, Materials Research, Mathematical Sciences, etc.
- Supporting individuals, RUI's, and special facilities or initiatives (Aspen Center for Physics, TASI summer school, LHC Theory Initiative, etc.)
- Trend: Dramatic increase in numbers of proposals, also huge numbers of new PIs applying

Program Director: K. Dienes

Theory Programs	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Awards issued	28	30	26	32	23	32	30
CAREER awards	2	1	2	1	1	1	1



# Experimental Particle Astrophysics Programs

- Underground Physics (PA): This area supports university research that generally locates experiments in low background environments:
  - IceCube Science Program
  - Underground experiments, reactor neutrinos
  - Neutrino mass measurements
  - Searches for the direct detection of Dark Matter
- Cosmic Phenomena (PA): This area supports university research that uses astrophysical sources and particle physics techniques to study fundamental physics:
  - Astrophysical sources of cosmic rays, gamma rays, neutrinos

Program Directors: D. Grant, W. Wester

Particle Astrophysics	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY2020	FY2021
Awards issued	26	16	17	25	18	28	27
CAREER awards	2	3	1	1	1	0	1



# DEI

- Making progress on Diversity, Equity, and Inclusion has been an NSF priority for a long time. Over the past few years we have taken additional steps in order to enhance our goals in these areas.
- NSF now offers a large number of funding opportunities aimed at broadening participation in our field (new PIs, new institutions). Some of these have been in existence for a while, others are new.
  - **New Investigator Workshops**: learn about grant writing, meet Program Directors, etc.
  - **MPS-ASCEND**: postdoctoral fellowships, cohort-building across MPS subdisciplines
  - **LEAPS-MPS**: entry grants for faculty to initiate research, to provide alternate entry portal into the funding stream
  - **MPS-HIGH**: for current NSF PIs, bring targeted high-schoolers into your research
  - **AGEP-GRS** and **PHY-GRS**: for current NSF PIs, Supplements to bring extra grad students into your group
  - **PREP**: partnerships between MSIs and our Physics Frontier Centers
  - Physics Division also has special **Broadening Participation (BP) funds**
  - Many additional programs being formulated....
- Also new MPS-wide and NSF-wide initiatives are coming!





# Funding Opportunities



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# Primary NSF Physics Funding Opportunities

(relevant for high-energy physics,  
particle astrophysics, and cosmology)



Proposal & Award  
Policies & Procedures  
Guide:

**New PAPPG  
now in  
effect!**

[https://www.nsf.gov/pubs/policydocs/pappg22\\_1/index.jsp](https://www.nsf.gov/pubs/policydocs/pappg22_1/index.jsp)

- <https://www.nsf.gov/pubs/2021/nsf21593/nsf21593.htm>: **Our general, all-purpose Solicitation for our regular base grants. Use this as your default.** Deadlines in Fall 2022, depending on specific program (see online).
- <https://www.nsf.gov/pubs/2014/nsf14579/nsf14579.htm>. (“RUI”) Same as above, but for applicants from primarily undergraduate institutions. Check eligibility with your SRO
- <https://www.nsf.gov/pubs/2022/nsf22586/nsf22586.htm>: (“CAREER”) An alternative funding track for those junior (untentured) faculty who, at this point in their careers, wish to undertake a *significant education/outreach activity* in addition to their research. **Not simply a research-excellence prize, and not intended as a default for junior faculty unless you plan a major mix of research and education/outreach.** Next deadline: July 27, 2022.
- [https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf22604](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf22604) (“LEAPS-MPS”) Grants designed to “*launch*” the careers of pre-tenure faculty... at minority-serving institutions (MSIs), predominantly undergraduate institutions (PUIs), and Carnegie Research 2 (R2) universities ... with the goal of achieving excellence through diversity.” *Launch* = you have no prior or current NSF grants (see special exceptions). Next deadline: January 26, 2023.
- [Supplements to existing NSF grants to fund a new graduate student](#). Emphasis placed on “increasing the involvement by members of underrepresented groups”. Apply anytime, fall preferred.
  - <https://www.nsf.gov/pubs/2020/nsf20083/nsf20083.jsp>: “MPS AGEP-GRS” (only for allowed institutions).
  - <https://www.nsf.gov/pubs/2021/nsf21065/nsf21065.jsp>: “PHY-GRS” (similar, but for remaining institutions).
- <https://www.nsf.gov/pubs/2022/nsf22501/nsf22501.htm>: (“MPS-Ascend”) Fellowships to “support postdoctoral Fellows who will broaden the participation of under-represented groups”. Postdocs or graduating PhDs apply on their own after identifying a potential postdoctoral mentor. ). Next deadline: look online for new solicitation!
- [Other Divisions, such as Division of Astronomy, Math...](#) Contact relevant Program Directors in both Divisions.

## PHY Contacts:

- **Jim Shank** ([jshank@nsf.gov](mailto:jshank@nsf.gov)) -- HEP Experiment
- **Keith Dienes** ([kdienes@nsf.gov](mailto:kdienes@nsf.gov)) -- HEP Theory & Particle Astro/Cosmo Theory
- **Darren Grant / William Wester** ([dgrant@nsf.gov](mailto:dgrant@nsf.gov) / [wwester@nsf.gov](mailto:wwester@nsf.gov)) -- Particle Astro Experiment
- **Kathy McCloud** ([kmcccloud@nsf.gov](mailto:kmcccloud@nsf.gov)) -- for LEAPS-MPS and MPS-Ascend

Once every three years (*including this year!*), the NSF Physics Division holds a competition for new **Physics Frontier Centers (PFCs)**.

[https://www.nsf.gov/publications/pub\\_summ.jsp?WT.z\\_pims\\_id=5305&ods\\_key=nsf22592](https://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=5305&ods_key=nsf22592)

PFCs = University-based centers and institutes where the collective efforts of a larger group of individuals can enable transformational advances in the most promising research areas. The program is designed to foster major breakthroughs at the intellectual frontiers of physics by providing needed resources such as combinations of talents, skills, disciplines, and/or specialized infrastructure, not usually available to individual investigators or small groups, in an environment in which the collective efforts of the larger group can be shown to be seminal to promoting significant progress in the science and the education of students.

Pre-proposals required!    Due **August 1, 2022**.

# 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
- This DCL encourages interdisciplinary research across the domains of AMO and EPP physics aimed at developing new small-scale experiments and techniques that could complement large EPP facilities.
- From 2021:
  - PM: Electron and Positron Magnetic Moments from a Quantum Cyclotron
  - PM: CeNTREX, A Search for Nuclear Time-Reversal Symmetry Violation with Quantum-State-Controlled TIF Molecules
  - PM: Precision Low-Energy Quantum Electrodynamic Theory and Fundamental Processes



# New Limited Opportunity in EPP-exp Program

- **NSF 22-097** Dear Colleague Letter: Partnership in Experimental Elementary Particle Physics and STEM Education Research to Promote Broadening Research Participation
  - Partnership between PHY and Division of Undergraduate Education (DUE)
  - With this Dear Colleague Letter (DCL), PHY and DUE encourage proposals that involve collaboration between an experimental physicist(s) involved in research with the ATLAS or CMS detector and an educator(s) conducting research in STEM education. This partnership between the investigators should enable them to concurrently carry out research in experimental elementary particle physics (EPP) and advance educational practice and education research at the undergraduate (college/university) level within state-of-the-art research environments in physics. NSF is especially interested in receiving proposals from collaborations that have these goals and expected outcomes:
    - Exhibit strong intellectual merit for both the experimental particle physics research and the STEM education research at the undergraduate (college/university) level,
    - Strengthen diverse participation in physics research, and
    - Increase the diversity, quantity, and quality of the next generation of STEM professionals.
    - This is a pilot initiative. It is anticipated that no more than two projects will be funded in FY 2023.





# Artificial Intelligence at NSF



# NSF-LED NATIONAL AI RESEARCH INSTITUTES

2020 and 2021 awards

The U.S. National Science Foundation (NSF) announced a **\$220 million** investment in eleven new Artificial Intelligence (AI) Research Institutes, building on the first round of seven AI Institutes totaling **\$140 million** funded last year. (The default map view below shows all awards combined).

★ LEAD ORGANIZATION ■ PRINCIPAL ORGANIZATIONS ● PARTNERS/COLLABORATORS



Download the interactive pdf version

- NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography
- NSF AI Institute for Foundations of Machine Learning
- USDA-NIFA AI Institute for Next Generation Food Systems
- USDA-NIFA AI Institute for Future Agricultural Resilience, Management, and Sustainability (AIFARMS)
- NSF AI Institute for Student-AI Teaming
- Molecule Maker Lab Institute (MMLI): NSF AI Institute for Molecular Discovery, Synthetic, and Manufacturing
- NSF AI Institute for Artificial Intelligence and Fundamental Interactions
- NSF AI Institute for Collaborative Assistance and Responsive Interaction for Networked Groups (AI-CARING)
- NSF AI Institute for Learning-enabled Optimization at Scale (TILOS)
- NSF AI Institute for Optimization
- NSF AI Institute for Intelligent Cyberinfrastructure with Computational Learning in the Environment (ICICLE)
- NSF AI Institute for Future Edge Networks and Distributed Intelligence (AI-EDGE)
- NSF AI Institute for Edge Computing Leveraging Next Generation Networks (Athena)
- NSF AI Institute for Dynamic Systems
- NSF AI Institute for Engaged Learning
- NSF AI Institute for Adult Learning and Online Education (ALOE)
- USDA-NIFA AI Institute: Agricultural AI for Transforming Workforce and Decision Support (AgAID)
- USDA-NIFA AI Institute: AI Institute for Resilient Agriculture (AIIRA)

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The map reflects the approximate location of the Institutes' lead and principal organizations, as well as their initial funded and unfunded partners. Note: Partners and collaborators related to an Institute may be represented with a single plot due to space limitations.



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This is an Interactive PDF and is best viewed using Adobe Acrobat. Hover cursor over dates below or circles to the right to display more information. If you have issues with these features you can download a standard PDF available [here](#).

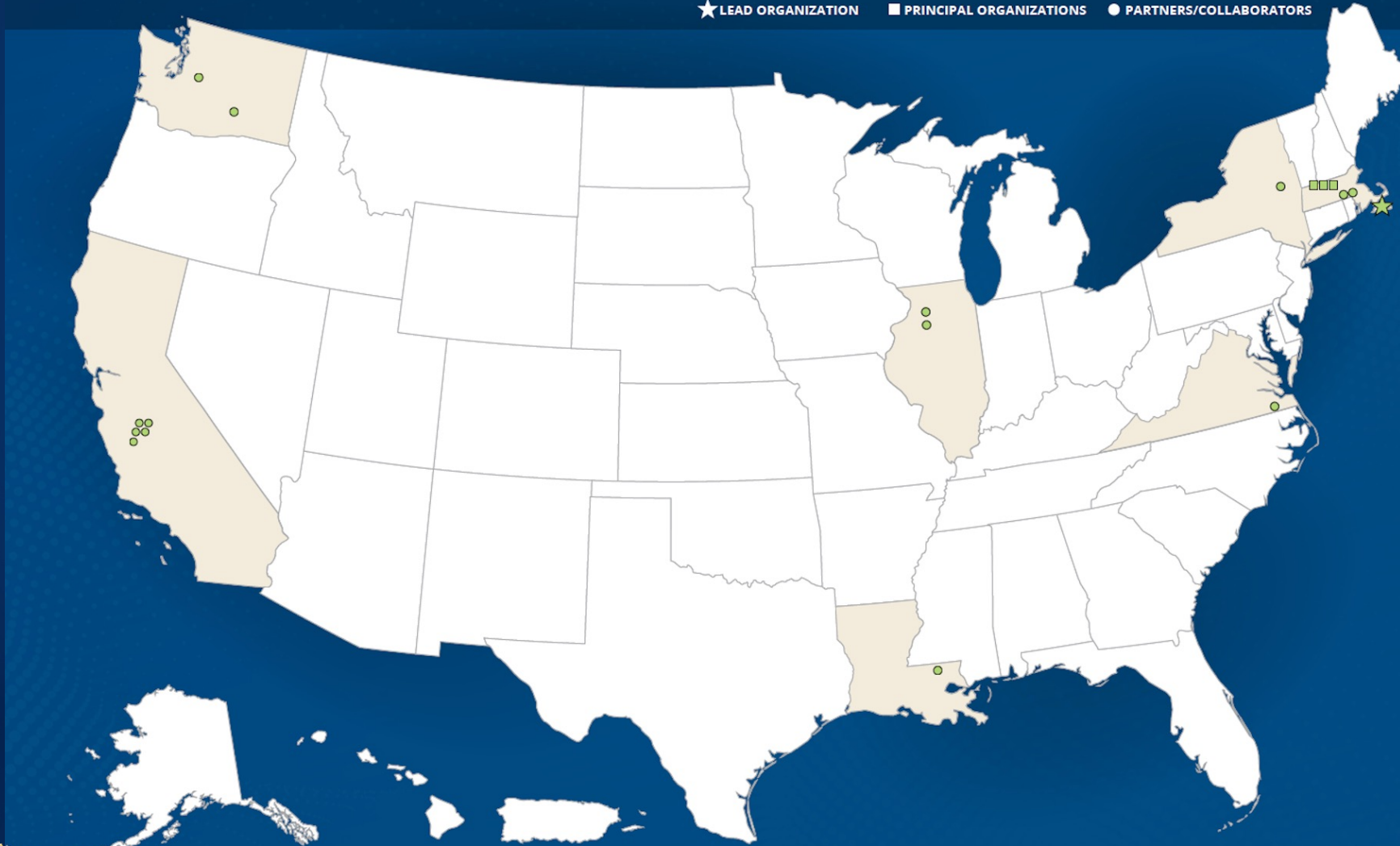
2020 Awards

2021 Awards

★ LEAD ORGANIZATION

■ PRINCIPAL ORGANIZATIONS

● PARTNERS/COLLABORATORS



The map reflects the approximate location of the Institutes' lead and principal organizations (staffing and/or activity), as well as their initial funded and unfunded partners. Note: Partners and collaborators related to an Institute may be represented with a single plot due to space limitations.

## AWARDS

- NSF AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography
- NSF AI Institute for Foundations of Machine Learning
- USDA-NIFA AI Institute for Next Generation Food Systems
- USDA-NIFA AI Institute for Future Agricultural Resilience, Management, and Sustainability (AIFARMS)
- NSF AI Institute for Student-AI Teaming
- Molecule Maker Lab Institute (MMLI): NSF AI Institute for Molecular Discovery, Synthetic, and Manufacturing
- NSF AI Institute for Artificial Intelligence and Fundamental Interactions**
  - LEAD:**
    - Massachusetts Institute of Technology
  - PRINCIPAL ORGANIZATIONS:**
    - Northeastern University – MA
    - Harvard University – MA
    - Tufts University – MA
  - PARTNERS/COLLABORATORS:**
    - MIT-Bates Computing Center – MA
    - CERN – Switzerland
    - Fermilab – IL
    - Jefferson Lab – VA
    - Argonne National Lab – IL
    - LIGO Scientific Collaboration – LA and – WA
    - Amazon – CA
    - X, the moonshot factory – CA
    - Xilinx – CA
    - IBM – NY
    - Nvidia – CA
    - DeepMind - London, UK
    - Microsoft Research – WA
    - Yandex - Moscow, Russia
    - MIT-IBM Watson AI Lab – MA
    - Sony - Tokyo, Japan
    - SalesForce – CA
- Online Education (ALOE)
- USDA-NIFA AI Institute: Agricultural AI for Transforming Workforce and Decision Support (AgAID)
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# AI Institutes

- Solicitation NSF 20-503 for 2020
- Solicitation NSF 20-604 for 2021 - less involvement with MPS
- And now Solicitation NSF 22-502 for 2022. Again, less relevance to MPS
  - National Artificial Intelligence (AI) Research Institutes Accelerating: Research, Transforming Society, and Growing the American Workforce
  - Theme 1: Intelligent Agents for Next-Generation Cybersecurity
  - Theme 2: Neural and Cognitive Foundations of Artificial Intelligence
  - Theme 3: AI for Climate-Smart Agriculture and Forestry
  - Theme 4: AI for Decision making
  - Theme 5: Trustworthy AI
  - Theme 6: AI-Augmented Learning to Expand Education Opportunities and Improve Outcomes
- MPS AI Dear Colleague Letter:
  - MPS ADAPT-DCL Started in 2021, resulting in 5 EAGER and 3 Supplement awards.
  - Continued in FY22 – funds just used up last week
- CISE/OAC HDR Institutes:
  - **Harnessing the Data Revolution : Institutes for Data-Intensive Research in Science and Engineering NSF 21-519**
  - Award to U. Washington in Sept. 2021. → A3D3
  - No new HDR Institute, but TRIPODS solicitation is ongoing:
    - **Harnessing the Data Revolution (HDR): Transdisciplinary Research in Principles of Data Science Phase II (TRIPODS)**
    - NSF 21-604. Submission Window: January 04, 2022 - January 18, 2022

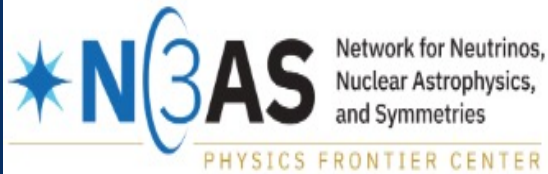


# NSF Particle Physics Centers and Institutes



Institute for Research and Innovation  
in Software for High Energy Physics

Center for Bright Beams Science  
and Technology Center

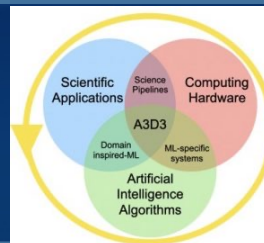


Network for Neutrinos, Nuclear  
Astrophysics, and Symmetries (N3AS)  
(Physics Frontier Center)

Institute for Artificial Intelligence and  
Fundamental Interactions



Harnessing the Data Revolution Institute:  
Accelerated AI Algorithms for Data-Driven  
Discovery (A3D3) (<https://a3d3.ai>)  
U. Washington



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# HDR Institute: Accelerated AI Algorithms for Data-Driven Discovery (A3D3)

Caltech

Duke  
UNIVERSITY

U.S. Hsu, U. Washington

UC San Diego

UC San Diego

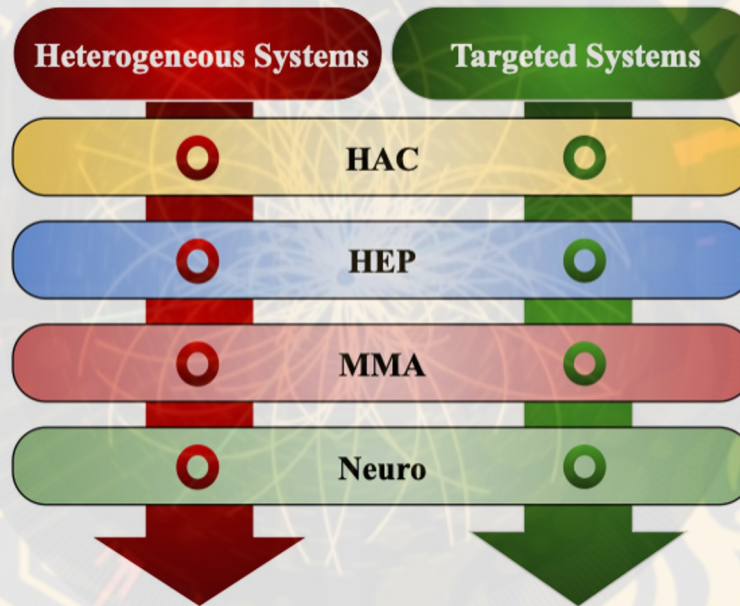
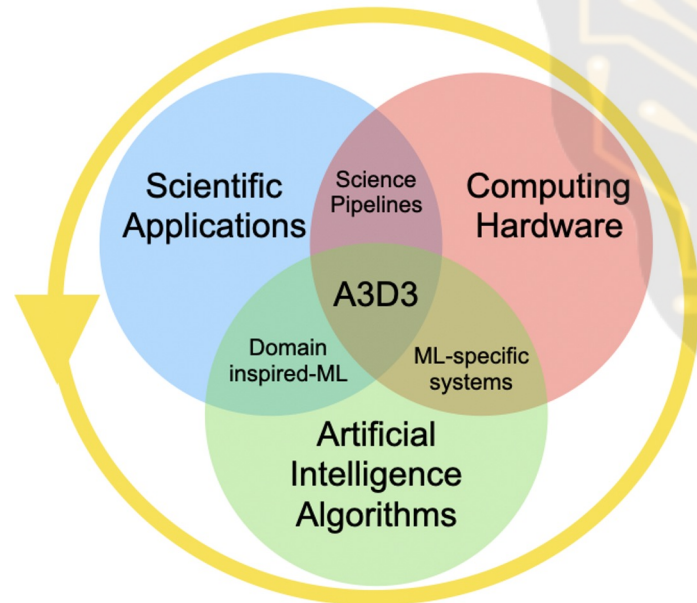
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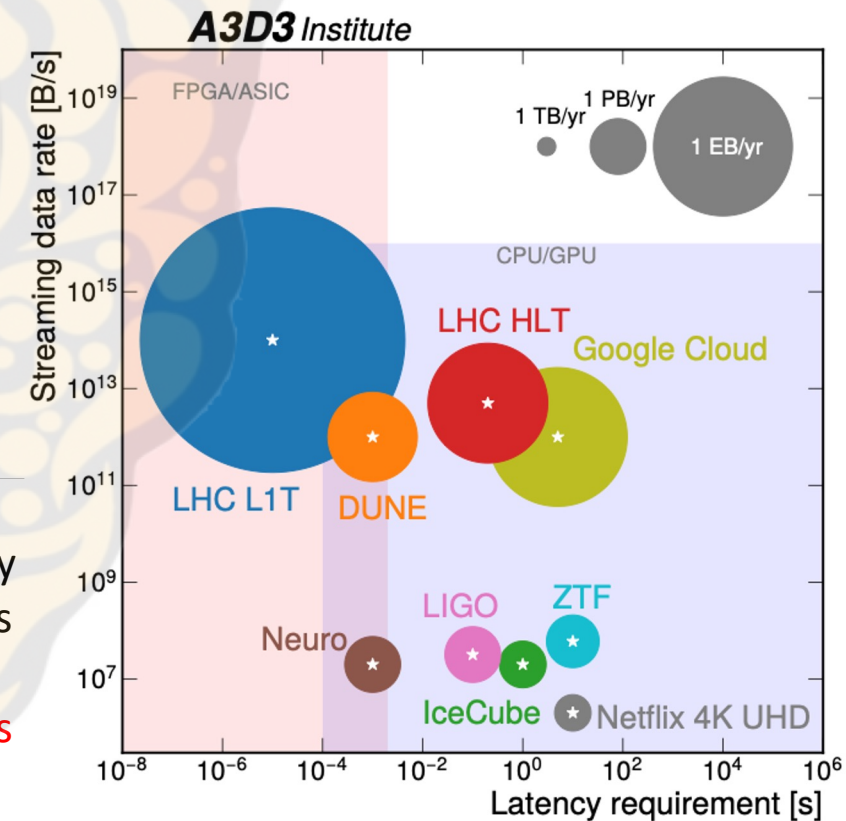
W

The vision of A3D3 is to establish a tightly coupled organization of **domain scientists**, **computer scientists**, and **engineers** that unite three core components which are essential to achieve **real-time AI** to transform science: **AI techniques**, **Computing Hardware**, **Scientific Applications**



Hardware and Algorithm Codevelopment (**HAC**) and three science drivers: high energy physics (**HEP**), multi-messenger astrophysics (**MMA**), and neuroscience (**Neuro**) are integrated through common **Heterogeneous** and **Targeted** Systems

A3D3 pushes the boundaries of data processing beyond industry applications





# NSF AI Planning Institute

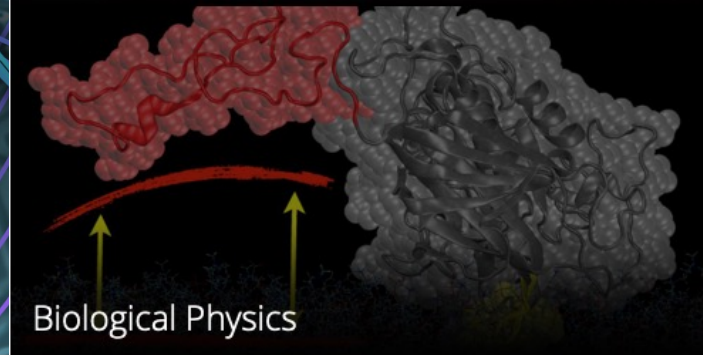
- Carnegie Mellon University. PI: Scott Dodelson
- Two year award



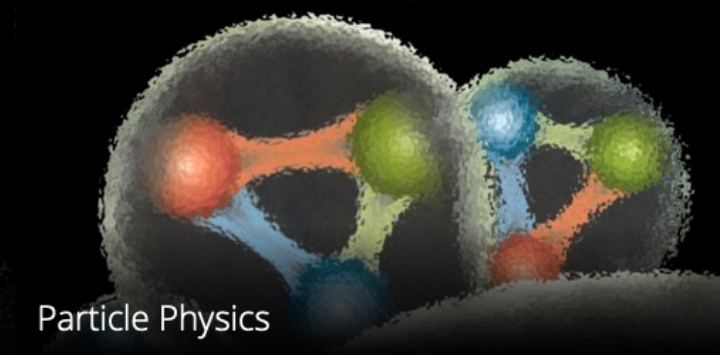
Artificial Intelligence



Astrophysics



Biological Physics



Particle Physics

# Research Infrastructure



7/20/2022

Snowmass CSS, Seattle

# Research Infrastructure Opportunities

	Project Cost (approx. in \$million)		Funding Source		
Solicitation	From	To	R&D/Planning	Operations	Scope of Competition
Individual program	0	~1.0	EPP or PA	EPP or PA	Program (within EPP or PA)
MRI (70%); University (30%)	~0.2	5.7	n/a	n/a	PHY (<1.0 M) NSF (>1.0 M)
Midscale RI-1	0.6-6.0	20	EPP or PA or Midscale RI-1	EPP or PA	NSF
Midscale RI-2	20	70	EPP or PA or Midscale RI-1	EPP or PA	NSF
MREFC	70	Now 100 --	EPP or PA	EPP or PA	NSF

First Awards in FY19 →

Four awards in FY21 →



7/20/2022

Snowmass CSS, Seattle

# MSRI-II awards 2020

- **Mid-scale RI-2 Consortium: Biogeochemical-Argo: A global robotic network to observe changing ocean chemistry and biology**  
Award Number:1946578; Principal Investigator:Kenneth Johnson; Co-Principal Investigator:Jorge Sarmiento, Stephen Riser, Lynne Talley, Curtis Deutsch, Susan Wijffels; Organization:Monterey Bay Aquarium Research Institute;NSF Organization:OCE Start Date:11/01/2020; Award Amount:\$15,013,704.00; Relevance:48.0;
- **Mid-scale RI-2: Grid-Connected Testing Infrastructure for Networked Control of Distributed Energy Resources**  
Award Number:1947050; Principal Investigator:Jan Kleissl; Co-Principal Investigator:Rajesh Gupta, Raymond De Callafon, Jorge Cortes, Sonia Martinez; Organization:University of California-San Diego;NSF Organization:ECCS Start Date:11/01/2020; Award Amount:\$30,557,829.00; Relevance:48.0;
- **Mid-scale RI-2 Consortium: Network for Advanced NMR**  
Award Number:1946970; Principal Investigator:Jeffrey Hoch; Co-Principal Investigator:Chad Rienstra, Arthur Edison, Katherine Henzler-Wildman; Organization:University of Connecticut Health Center;NSF Organization:DBI Start Date:07/01/2021; Award Amount:\$20,048,344.00; Relevance:48.0;
- **Mid-scale RI-2: A first-of-its-kind X-ray facility for new science at the high magnetic field frontier**  
Award Number:1946998; Principal Investigator:Joel Brock; Co-Principal Investigator:Carlos Cabrera, Eric Palm, Elke Arenholz; Organization:Cornell University;NSF Organization:DMR Start Date:01/01/2021; Award Amount:\$8,391,000.00; Relevance:48.0;





# Mid-Scale Research Infrastructure

- Webinar from Nov. 2020: [weblink](#)
- Mid-Scale RI-1 Solicitation: [21-505](#)
- Preliminary Proposal Deadline Date: January 7, 2021
- **Full Proposal Deadline Date:** April 23, 2021 (By Invitation Only)
- Mid-Scale RI-1 Implementation projects Total cost: \$6M - \$20M
- Mid-Scale RI-1 Design projects Total cost: \$600k - \$20M
- Mid-Scale RI-2 Solicitation: [21-537](#)
- Letter of Intent Deadline Date: **Feb.3**, 2021 , Prelim proposal: Mar. 5, Full: Sept. 20, 2021
- Mid-Scale RI-2 Projects Total cost: \$20M - \$100M
- Consult the Major Facilities Guide [NSF 19-068](#)

