



# National Science Foundation – Nuclear Physics

## Outline

- Long Range Plan
- FY24 Budget Info
- Funding Announcements
- Highlights
- Changes at NSF



Allena K. Opper  
October 2023

October 2023

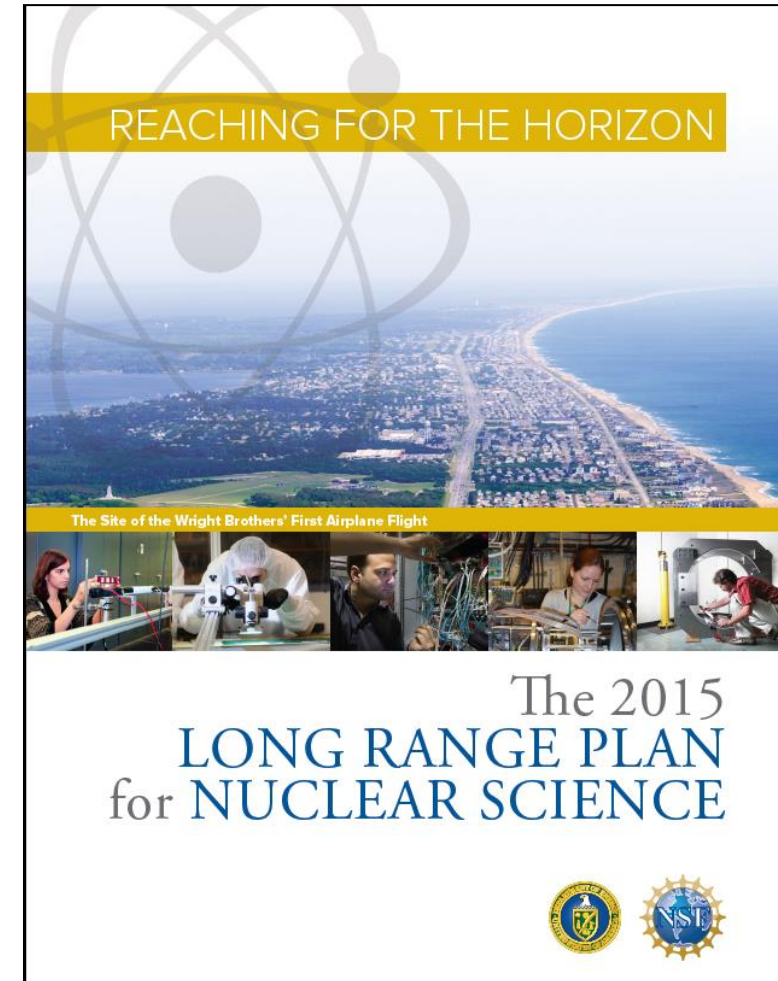
NSAC Meeting





# Long Range Plan for the Nation's Nuclear Science

- 2015 LRP
  - Charge letter dated 23-apr-2014
  - LRP report due by October 2015
  - LRP report presented 15-oct-2015
- 2023 LRP
  - Charge letter dated 11-jul-2022
  - LRP report due by October 2023
    - ie 2.5 months less time
- Thank you to
  - NSAC, NSAC sub-committee
  - DNP, DNP Town Hall organizers
  - Nuclear science community



# NSAC: effective & strategic planning → credibility & respect



1979

1983

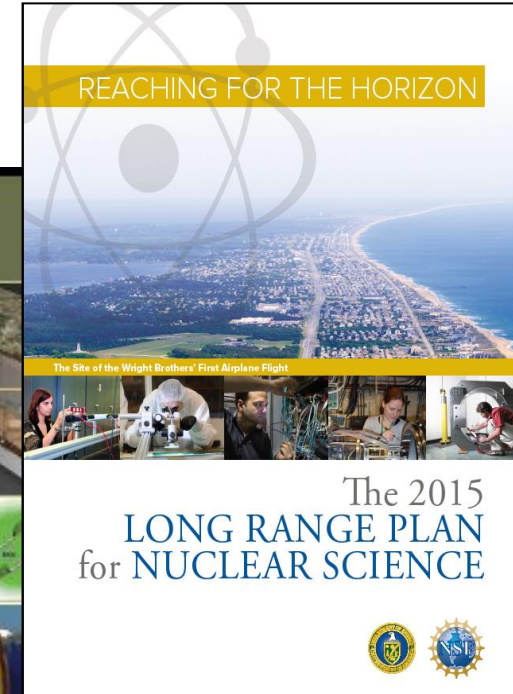
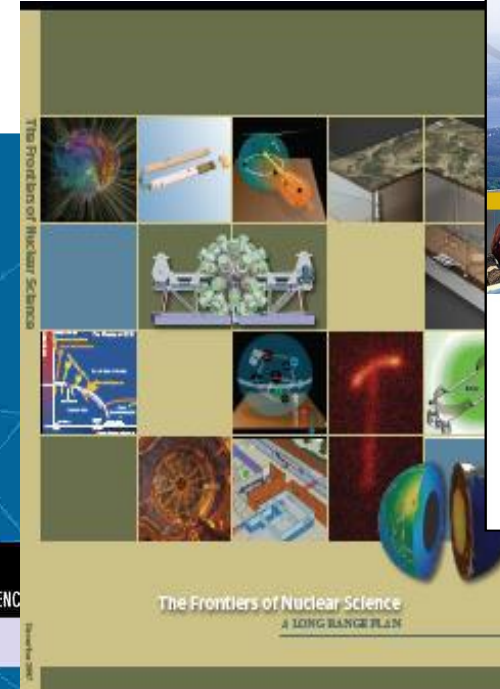
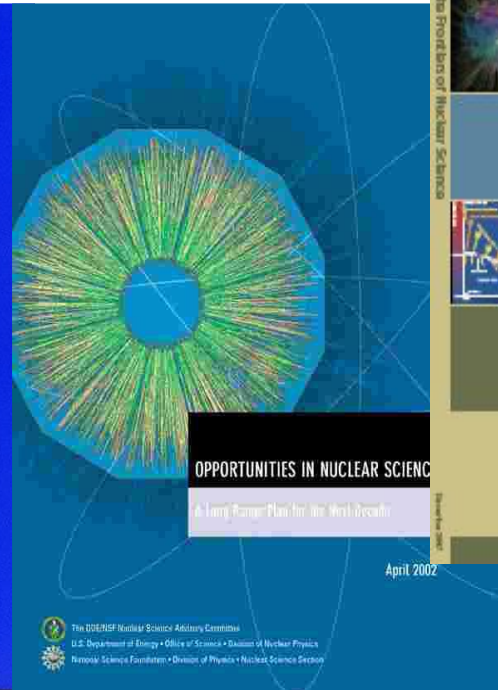
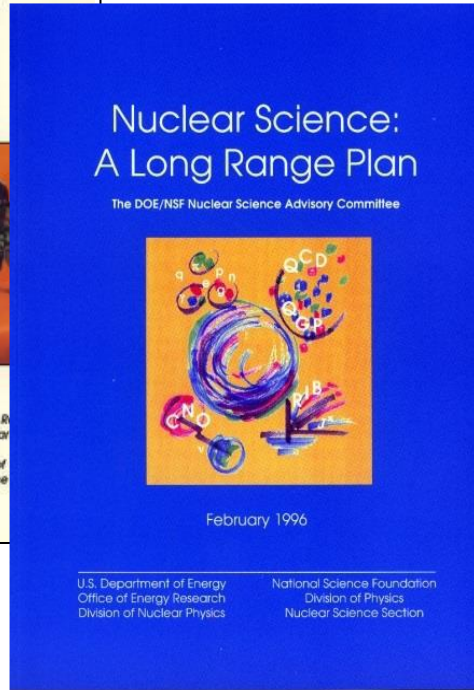
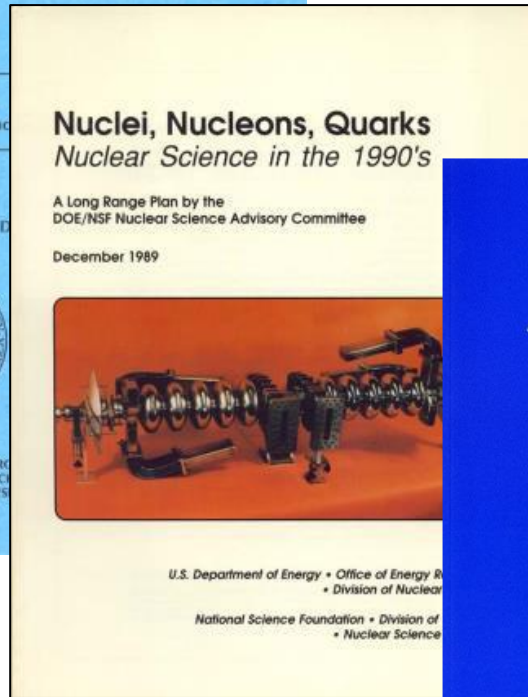
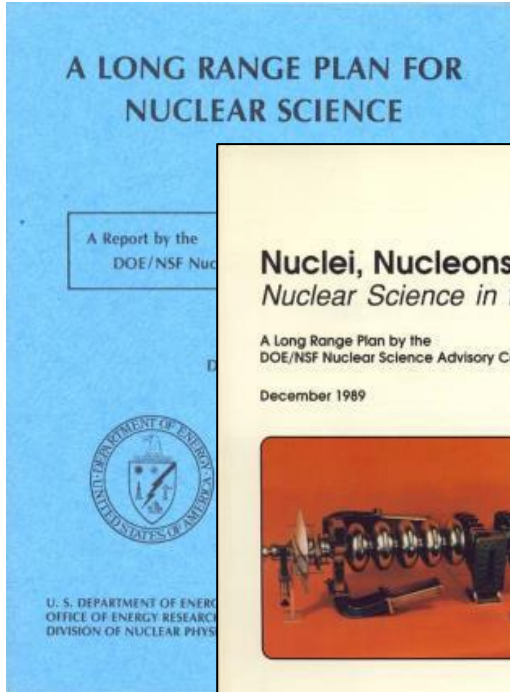
1989

1996

2002

2007

2015







# FY24 President's Budget Request – NSF (\$M)

NSF by Account	FY 2022 Actual <sup>1</sup>	FY 2023 Estimate Base <sup>2</sup>	FY 2023 Estimate Total	FY 2024 Request	FY 2024 Request Compared to			
					FY 2022 Actual		FY 2023 Base Total <sup>3</sup>	
					Amount	Percent	Amount	Percent
<b>Research &amp; Related Activities</b>	\$6,964.66	\$7,006.136	\$7,826.80	\$9,029.90	\$2,065.24	29.7%	\$1,415.60	18.6%
STEM Education	\$1,146.72	\$1,154.00	\$1,371.00	\$1,444.18	\$297.46	25.9%	\$198.18	15.9%
Major Res. Equip. & Fac. Construction <sup>1</sup>	\$120.60	\$187.23	\$187.23	\$304.67	\$184.07	152.6%	\$117.44	62.7%
Agency Operations & Award Mgmt.	\$420.21	\$463.00	\$463.00	\$503.87	\$83.66	19.9%	\$40.87	8.8%
Office of Inspector General	\$18.89	\$23.39	\$23.39	\$26.81	\$7.92	41.9%	\$3.42	14.6%
National Science Board	\$4.52	\$5.09	\$5.09	\$5.25	\$0.73	16.2%	\$0.16	3.1%
<b>Total, NSF Discretionary Funding</b>	<b>\$8,675.61</b>	<b>\$8,838.85</b>	<b>\$9,876.51</b>	<b>\$11,314.68</b>	<b>\$2,639.07</b>	<b>30.4%</b>	<b>\$1,775.67</b>	<b>18.6%</b>
STEM Education - H-1B Visa	278.48	192.54	192.54	198.84	-79.64	-28.6%	6.30	3.3%
Donations	25.94	40.00	40.00	40.00	14.06	54.2%	-	-
<b>Total, NSF Mandatory Funding</b>	<b>\$304.42</b>	<b>\$232.54</b>	<b>\$232.54</b>	<b>\$238.84</b>	<b>-\$65.58</b>	<b>-21.5%</b>	<b>\$6.30</b>	<b>2.7%</b>
<b>Total, NSF Budgetary Resources</b>	<b>\$8,980.03</b>	<b>\$9,071.39</b>	<b>\$10,109.05</b>	<b>\$11,553.52</b>	<b>\$2,573.49</b>	<b>28.7%</b>	<b>\$1,781.97</b>	<b>18.2%</b>



# FY24 President's Budget Request – MPS (\$M)

	FY 2022 Actual <sup>1</sup>	FY 2023 Estimate Base	Disaster Relief Supplemental		FY 2023 Estimate Total	FY 2024 Request	Change over FY 2023 Base Total <sup>2</sup>	
			RI Damage Base	Mitigation			Amount	Percent
Astronomical Sciences (AST)	\$283.61	\$283.57	\$8.76	-	\$292.33	\$303.33	\$11.00	3.8%
Chemistry (CHE)	265.19	264.46	4.37	-	268.83	279.83	11.00	4.1%
Materials Research (DMR)	338.75	338.78	0.63	-	339.41	350.41	11.00	3.2%
Mathematical Sciences (DMS)	248.32	247.99	4.00	-	251.99	262.99	11.00	4.4%
Physics (PHY)	309.89	308.90	4.23	-	313.13	324.13	11.00	3.5%
Office of Strategic Initiatives (OSI) <sup>3</sup>	169.50	169.20	48.45	2.50	220.15	315.10	97.45	44.8%
<b>Total</b>	<b>\$1,615.26</b>	<b>\$1,612.90</b>	<b>\$70.44</b>	<b>\$2.50</b>	<b>\$1,685.84</b>	<b>\$1,835.79</b>	<b>\$152.45</b>	<b>9.1%</b>



# FY24 PBR, House, & Senate (\$M)

NSF by Account	FY 2022 Actual	FY 2023 Estimate Total	FY 2024 Request	House Mark	Senate Mark
<b>Research &amp; Related Activities</b>	\$6,964.66	\$7,826.80	\$9,029.90	\$7,867	\$7,608
<b>STEM Education</b>	\$1,146.72	\$1,371.00	\$1,444.18	\$1,006	\$1,228
<b>Major Res. Equip. &amp; Fac. Construction</b>	\$120.60	\$187.23	\$304.67	\$254	\$187
<b>Agency Operations &amp; Award Mgmt.</b>	\$420.21	\$463.00	\$503.87	\$472	\$448
<b>Office of Inspector General</b>	\$18.89	\$23.39	\$26.81	\$27	\$23
<b>National Science Board</b>	\$4.52	\$5.09	\$5.25	\$5	\$5
<b>Total, NSF Discretionary Funding</b>	<b>\$8,675.61</b>	<b>\$9,876.51</b>	<b>\$11,314.68</b>	<b>\$9,630</b>	<b>\$9,500</b>



# What Happens During a Continuing Resolution (CR)

- CR = temporary spending bill that allows continuation of the federal government operations when final appropriations have not been approved by Congress and the President
- Generally, continue funding at prior year's level
  - Current CR is for 45 days → NSF has \$9.876 B \* (45/365) = \$1.228 B
  - BUT ... time to get \$ into accounts
    - ... risk management → limit expenditures
- PIs expecting funding in 1<sup>st</sup> quarter may have to wait

# What Happens at NSF During a Lapse in Appropriations



- Continues
  - Proposal preparation and submission via Research.gov and Grants.gov
  - Notifications and Requests
  - Project Reporting
  - Ad Hoc Proposal Review via FastLane
- Unavailable
  - Panelist Functions
  - Most NSF staff
- IPA Rotators will have remote access to all NSF systems
- Proposal deadlines during or after a lapse will be considered by Policy for extension





# 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~~



# Funding Announcements

## PHY Investigator Initiated Research NSF 23-615

All proposals submitted to the Division of Physics programs must go through this solicitation.

- **Deadlines:** First Tuesday in December for *Experimental & Theoretical Nuclear Physics*  
→ **December 12, 2023 5 pm in your home institution's time zone**
- Follow instructions that are specific to this solicitation; **non-compliant proposals may be returned without review**
- Must conform to the NSF Proposal & Award Policies & Procedures Guide (PAPPG)  
[https://www.nsf.gov/pubs/policydocs/pappg22\\_1/index.jsp](https://www.nsf.gov/pubs/policydocs/pappg22_1/index.jsp)
  - Updated instructions regarding Current and Pending Support and Biographical Sketches of senior personnel
- Submission through Research.gov or Grants.gov (not FastLane 😞)

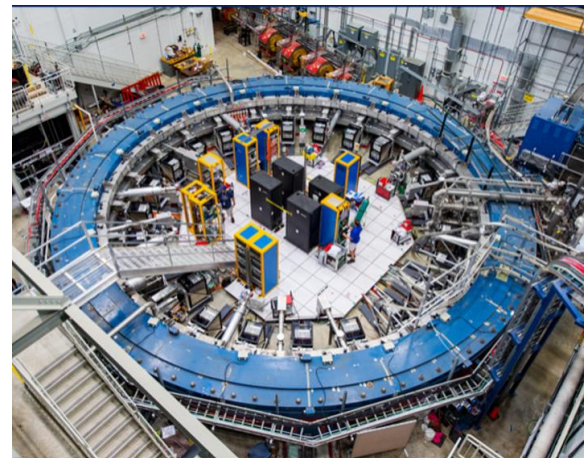
**Questions – contact cognizant program director.**



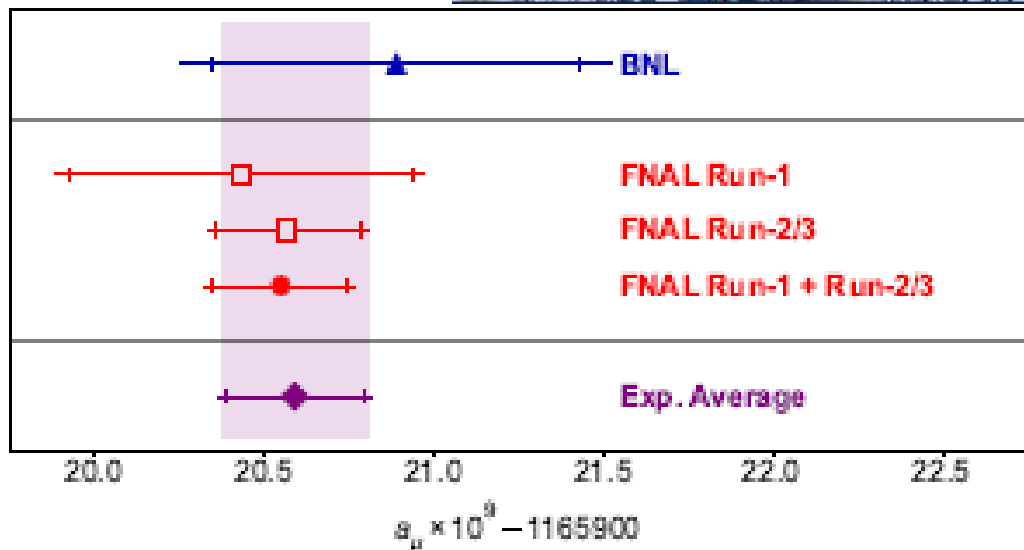


# New results from FNAL $\mu$ (g-2)

<https://indico.fnal.gov/event/60738/>



- Precision test of Standard Model and BSM
- BNL result  $\sim 2000$
- FNAL expt approved in 2012 (CD0)
  - Move magnet from BNL to FNAL
  - Lots of redesign and rebuilding
- Six data runs



$$a_\mu^{SM} = a_\mu^{QED} + a_\mu^{EW} + a_\mu^{Hadron}$$

\*Theory:  $g = 2.00233183620(86)$   $a = 0.00116591810(43)$

Exp avg:  $g = 2.00233184110(43)$   $a = 0.00116592059(22)$   $\Delta = 5.0 \sigma$

\* from 2020



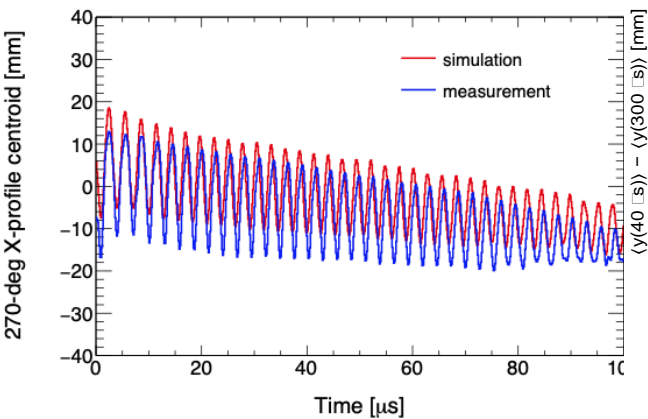


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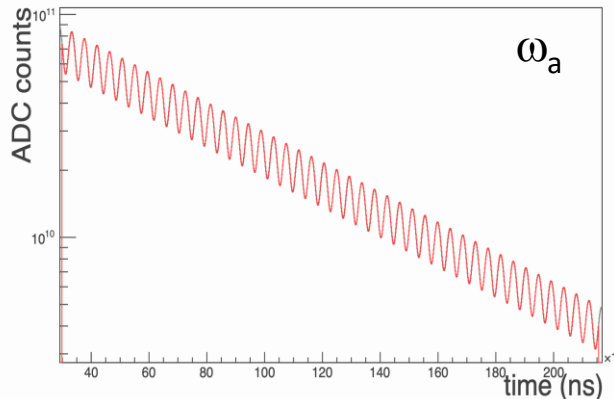
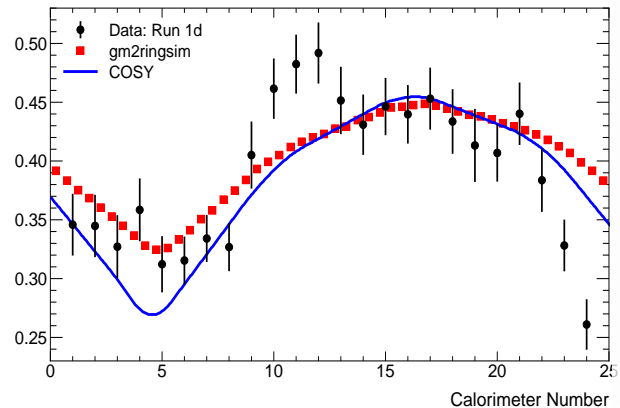
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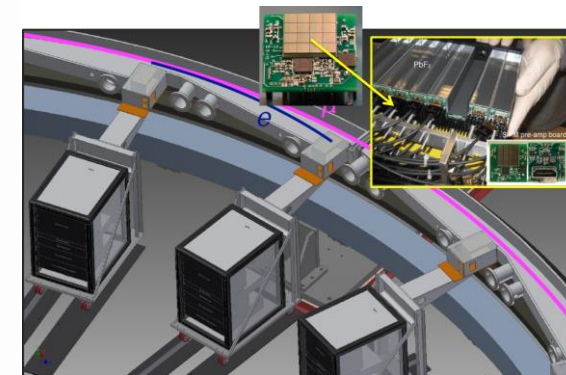
### Fiber harps (RU)



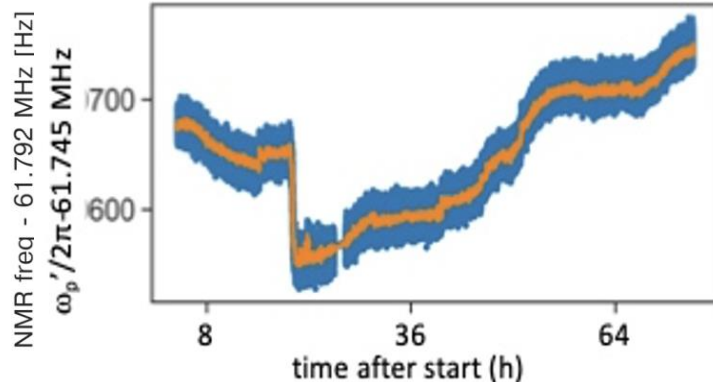
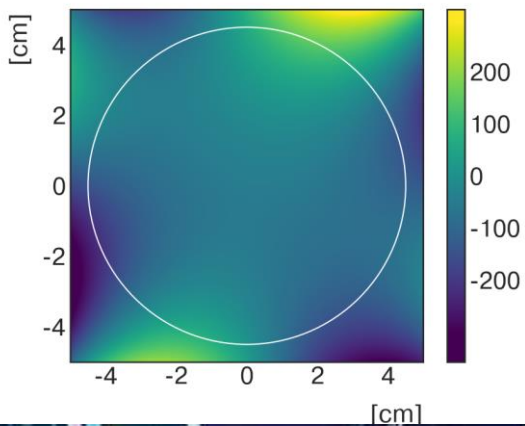
### Simulations and Integrated energy analysis(UKy)



### MRI (UW and Cornell)



### Field maps and tracking (JMU, UM, UVa)



### $^3\text{He}$ Calibration (UM)



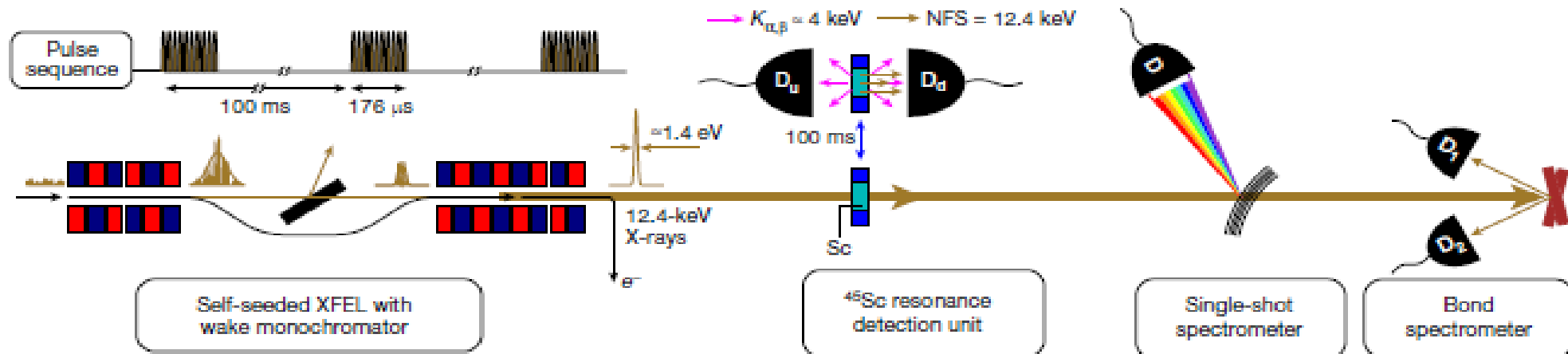
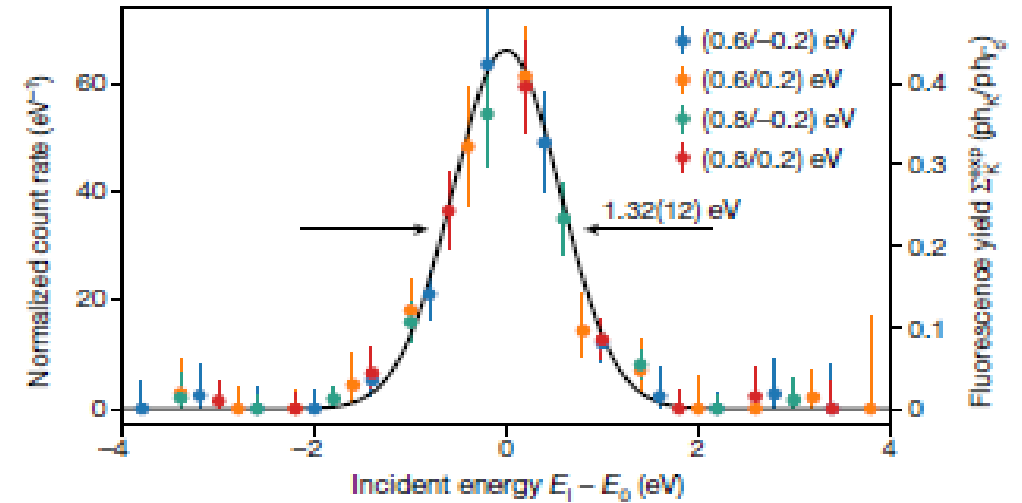
### Calorimeter XLS, SiPMs, electronics, ...





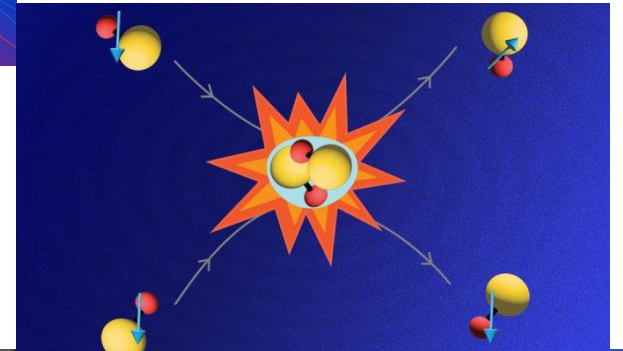
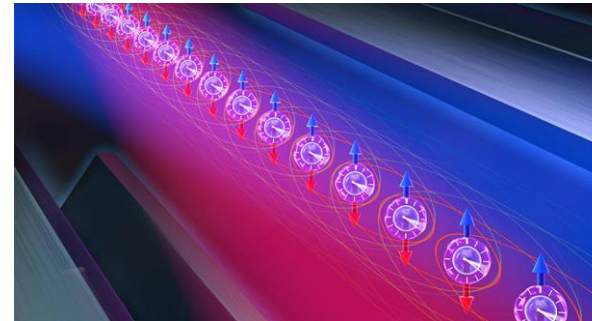
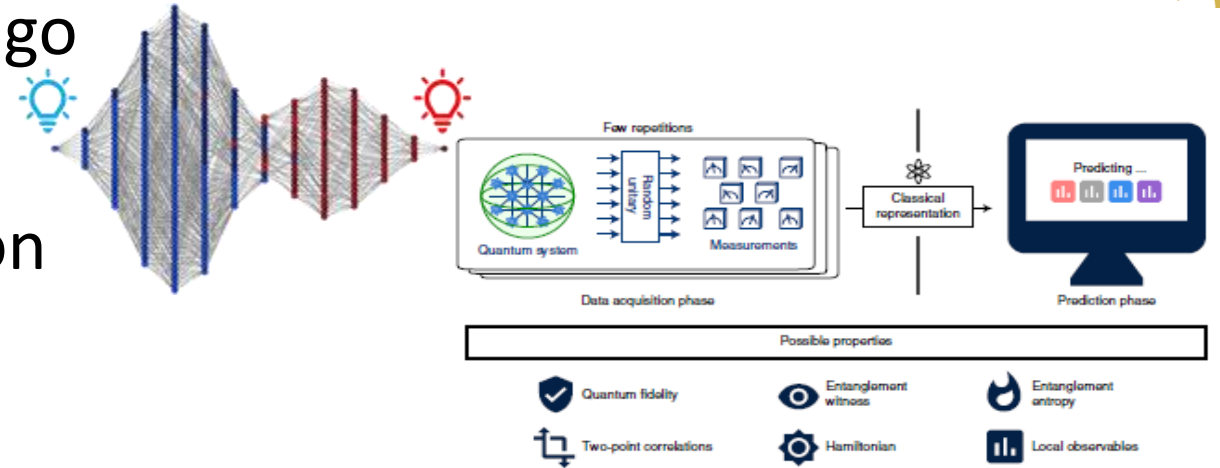
# $^{45}\text{Sc}$ Nuclear Clock

- Excitation of 12.4 keV resonance,  $\Gamma = 1.4$  feV,  $\delta = 10^{-19}$  @ European XFEL
- Meticulous tuning & extreme noise reduction
- Current standard:  $^{133}\text{Cs}$  atomic clock
  - $\delta = 10^{-16}$



# Four Physics Frontier Centers Funded

- PFC for Living Systems @ U Chicago
- Institute for Quantum Information and Matter @ Cal Tech
- Comprehension and Control of Emerging Complexity at Q Frontier @ UC Boulder
- Center for Ultra Cold Atoms @ MIT







# 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)



# NSF/MPS/PHY Personnel

- Sethuraman Panchanathan – Director
- Denise Caldwell – Acting Assistant Director for MPS
- ??? ???? – 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:

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- 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

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Physics (PHY)

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### Physics (PHY)

PHY Replaces DCL with Solicitation NSF 14-576

The Physics Division has issued a solicitation ([NSF 14-576](#)) for FY2015 that replaces its prior annual Dear Colleague Letter. The solicitation follows most of the requirements in the Grant Proposal Guide, but has additional requirements that relate primarily to proposers who anticipate having multiple sources of support, and proposals involving significant instrumentation development. The solicitation also has deadlines instead of target dates. All proposals submitted to the Physics Division that are not governed by another solicitation (such as CAREER) should be submitted to this solicitation; otherwise they will be returned without review.

PHY Int'l Activities - Potential Co-Review

The Physics Division has issued a Dear Colleague Letter ([NSF 14-009](#)) to announce the guidelines for "International Activities within the Physics Division - Potential International Co-Review". The DCL outlines a possible coordinated review of projects involving international colleagues and counterpart funding organizations where a mutual review and funding process is beneficial to the advancement of Physics research. Contact with the appropriate NSF Program Officer is a necessary first step and additional time for this coordination must be allowed. Proposals requesting co-review will be competing with all other proposals in that area and must succeed on the strengths of their intellectual merit and broader impact.

Special Announcements

[MPS Alliances for Graduate Education and the Professoriate - Graduate Research Supplements \(AGEP-GRS\) Dear Colleague Letter \(NSF 13-071\)](#)

[Dear Colleague Letter - Announcement of Instrumentation Fund to Provide Mid-Scale Instrumentation for FY2014 Awards in Physics Division \(NSF 13-118\)](#)

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- Chemistry (CHE)
- Materials Research (DMR)



*Thank You!*