



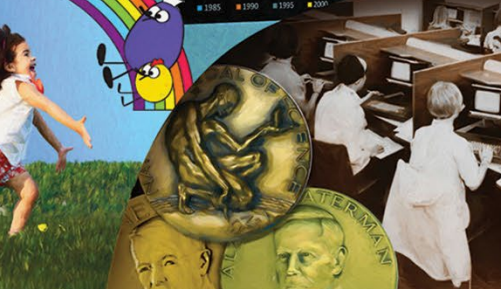
National Science Foundation – Nuclear Physics

Outline

- Nuclear Physics Info
- FY22 & FY23 Budget Info
- Funding Announcements and Successes
- Highlights



Allena K. Opper
June 2022



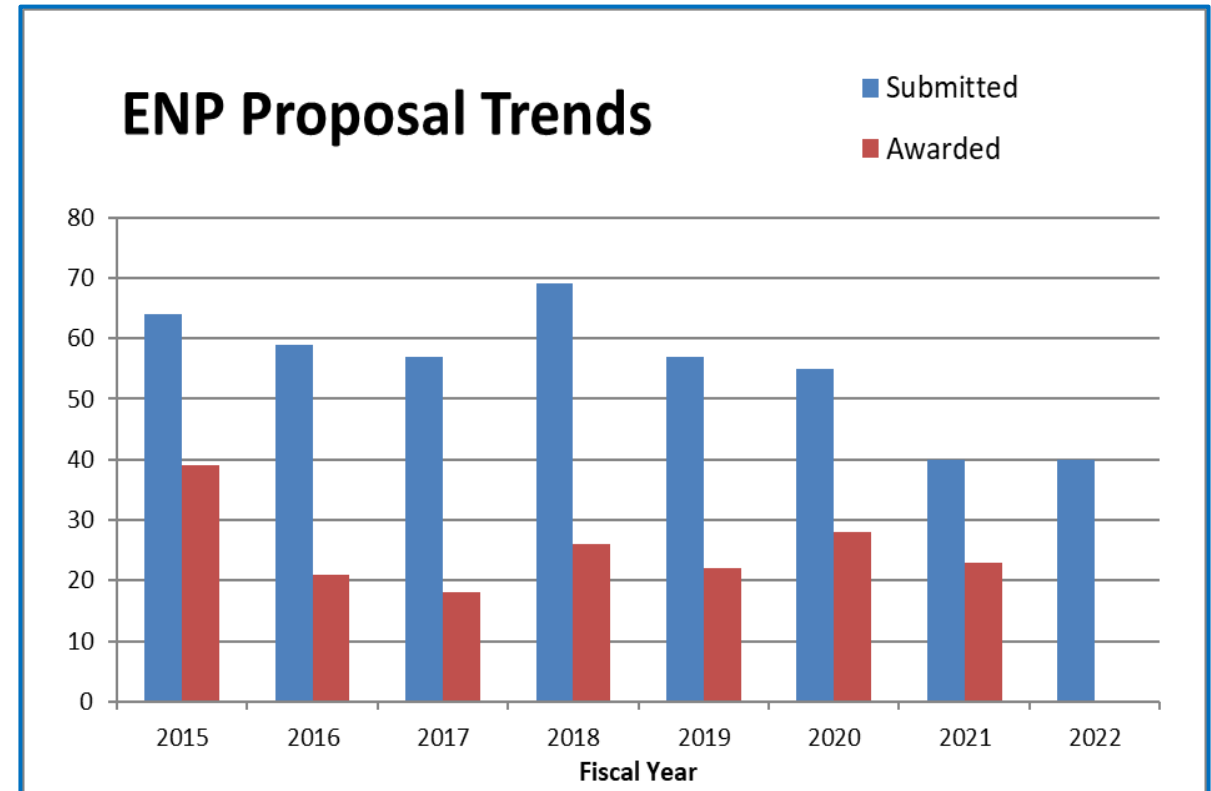
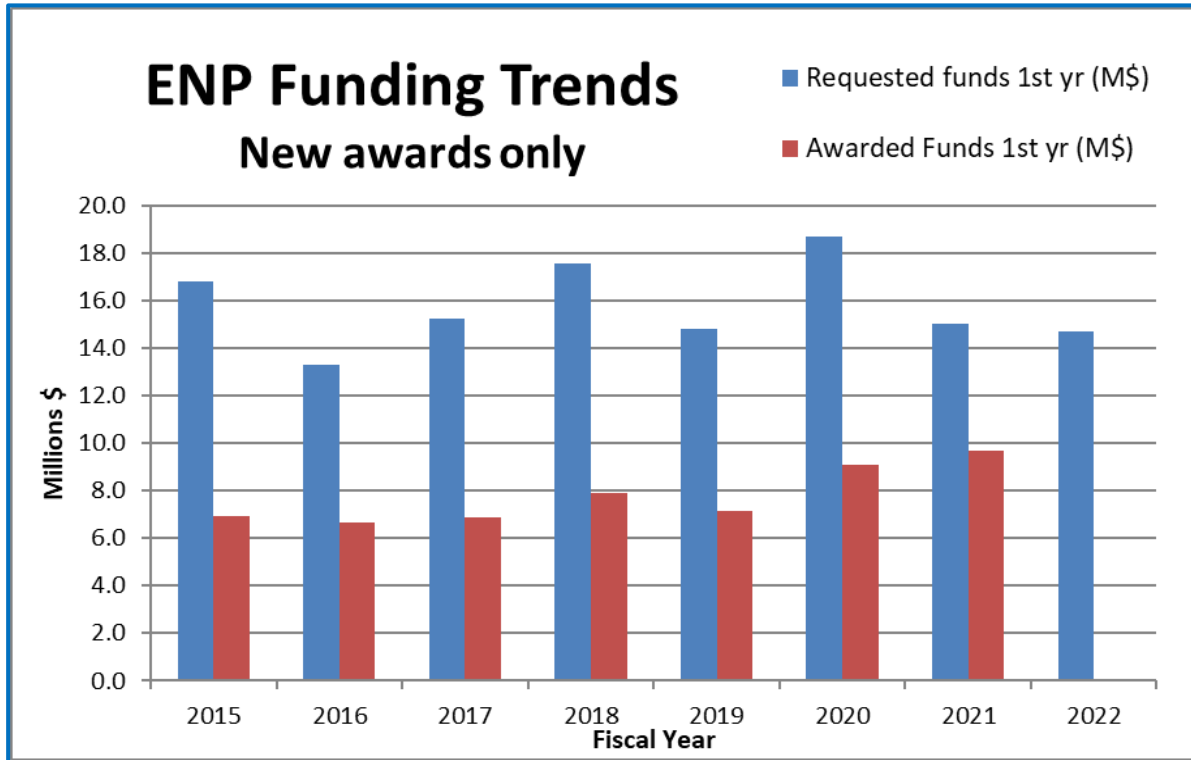


NSF/MPS/PHY Personnel

- 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

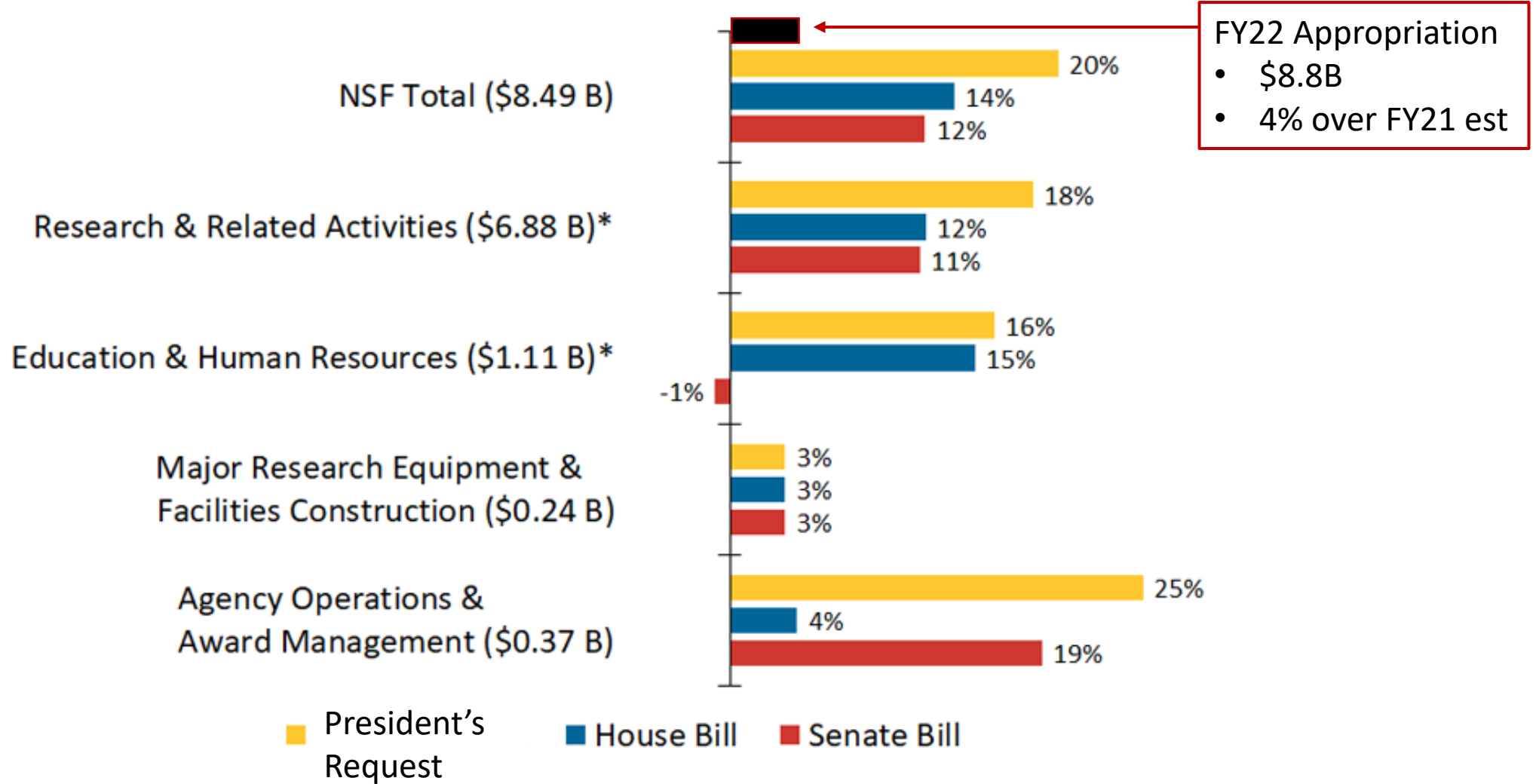


Proposal Trends in Experimental Nuclear Physics



FY22 Budget Proposals – NSF

\$ in () = FY21 estimates



* Figures account for consolidation of the Graduate Research Fellowship Program budget in the EHR directorate.



Director's vision points to opportunities we must seize:

- Strengthening Established NSF
 - NSF's central focus = accelerate discovery and enhance state of the art research capabilities
- Bringing the “Missing Millions” into the STEM Workforce
 - There is tremendous untapped STEM potential throughout the nation
- Accelerating Partnerships
 - NSF will foster partnerships with other agencies, private industry, philanthropy, like-minded countries – and thriving partnership environments

FY 2023
BUDGET REQUEST
TO CONGRESS





FY23 President's Budget Request – NSF (\$M)

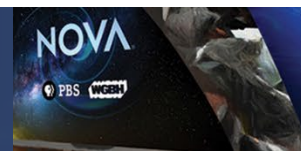
What Congress appropriates

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 ¹	Request	Amount	Percent	Amount	Percent
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
MPS	1,593.31	20.33		1,746.847	153.54	9.6%	N/A	N/A
SBE	282.11	18.16		330.21	48.10	17.0%	N/A	N/A
TIP ²	369.01	19.87		879.87	510.86	138.4%	N/A	N/A
<i>TIP Programs</i>	136.73	2.00		596.81	460.08	336.5%	N/A	N/A
<i>SBIR/STTR, including Operations</i>	232.28	17.87		283.06	50.78	21.9%	N/A	N/A
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 ³	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
Research & Related Activities	\$6,761.35	\$195.54	\$7,159.40	\$8,425.987	\$1,664.63	24.6%	\$1,266.59	17.7%
STEM Education^{3,4}	\$1,110.85	\$23.99	\$1,006.00	\$1,377.18	\$266.33	24.0%	\$371.18	36.9%
Major Research Equipment & Facilities	\$161.27	\$8.95	\$249.00	\$187.23	\$25.96	16.1%	-\$61.77	-24.8%
Agency Operations & Award Management	\$384.52	\$12.00	\$400.00	\$473.20	\$88.68	23.1%	\$73.20	18.3%
Office of Inspector General	\$17.61	-	\$19.00	\$23.393	\$5.78	32.8%	\$4.39	23.1%
Office of the National Science Board	\$4.43	-	\$4.60	\$5.09	\$0.66	14.9%	\$0.49	10.7%
Total, NSF Discretionary Funding	\$8,440.03	\$240.48	\$8,838.00	\$10,492.08	\$2,052.05	24.3%	1654.08	18.7%
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%	-	-
Total, NSF Mandatory Funding	\$172.45	-	\$172.47	\$168.86	-\$3.59	-2.1%	-\$3.61	-2.1%
Total, NSF Budgetary Resources	\$8,612.48	\$240.48	\$9,010.47	\$10,660.94	\$2,048.46	23.8%	\$1,650.47	18.3%



FY23 President's Budget Request – MPS (\$M)

	FY 2021	FY 2021	FY 2022	FY 2023	Change over	
	Actual	ARP Actual	(TBD)	Request	FY 2021 Actual Amount	Percent
Astronomical Sciences (AST) ¹	\$289.27	-	-	\$294.05	\$4.78	1.7%
Chemistry (CHE)	259.60	-	-	284.14	24.54	9.5%
Materials Research (DMR)	330.07	-	-	349.92	19.85	6.0%
Mathematical Sciences (DMS)	243.66	-	-	259.47	15.81	6.5%
Physics (PHY)	304.42	-	-	316.59	12.17	4.0%
Office of Multidisciplinary Activities (OMA)	166.29	20.33	-	242.677	76.39	45.9%
Total	\$1,593.31	\$20.33	-	\$1,746.847	\$153.54	9.6%





Faculty Career Development Program (CAREER)

- CAREER - Awards in support of early-career faculty who have the potential to serve as academic role models in research **and education**, and to lead advances in the mission of their department or organization.
 - Integration of Research and Education - CAREER proposals should describe an integrated path that will lead to a career as a researcher and educator
- PECASE - Presidential Early Career Awards for Scientists and Engineers from among the most meritorious recent CAREER awardees
- Eligibility – must be untenured assistant professor in position that is at least 50% tenure-track
- Five year award

New Solicitation! →

NSF 22-586





PHY DCL: Growing a Strong, Diverse Workforce NSF 21-065

PHY-GR Supplements – emphasis on URM^s in STEM fields

- Graduate Student Eligibility
 - Not currently supported by federal government (NSF, DOE, NIH, ...)
 - US Citizen, US National, or US Permanent Resident
- Stipend, tuition, benefits, and IDC (~\$60k)
- Renewable up to two times, no deadline for submission however, early submission suggested

REU Supplements – emphasis on URM^s in STEM fields

- US Citizen, US National, or US Permanent Resident





MPS – ASCEND

ASCEND - Postdoctoral Research Fellowships NSF 22-501

- Goal: to support Postdoctoral Fellows who **will broaden the participation of groups who are underrepresented in Mathematical and Physical Sciences (MPS) fields in the U.S.**
- Prepare PD Fellows to transition from a postdoctoral position into the first few years of an academic faculty position
- Fellowships are **awards to individuals**, not institutions, and are administered by the Fellows
- \$100k/year for up to 3 years



MPS – ASCEND



ASCEND - Postdoctoral Research Fellowships

FY21: 33 MPS ASCEND Fellows (7 in PHY)

FY22: 31 MPS ASCEND Fellows (6 in PHY)

Including Brandon Sumner:

Determine properties of excited cascade states, search for new states using data from GlueX at JLab, & develop in-person K – 12 outreach

Arizona State University with Michael Dugger





MPS – LEAPS

LEAPS: Launching Early-Career Academic Pathways in MPS NSF 22-503

- Designed to launch research careers of pre-tenure faculty in MPS fields, emphasis on *minority-serving institutions (MSIs)*, *predominantly undergraduate institutions (PUIs)*, and *Carnegie Research 2 (R2) universities* while promoting the participation of the entire MPS scientific community
- Awards = 24 months, up to \$250k



MPS – LEAPS

LEAPS: Launching Early-Career Academic Pathways in MPS NSF 22-503

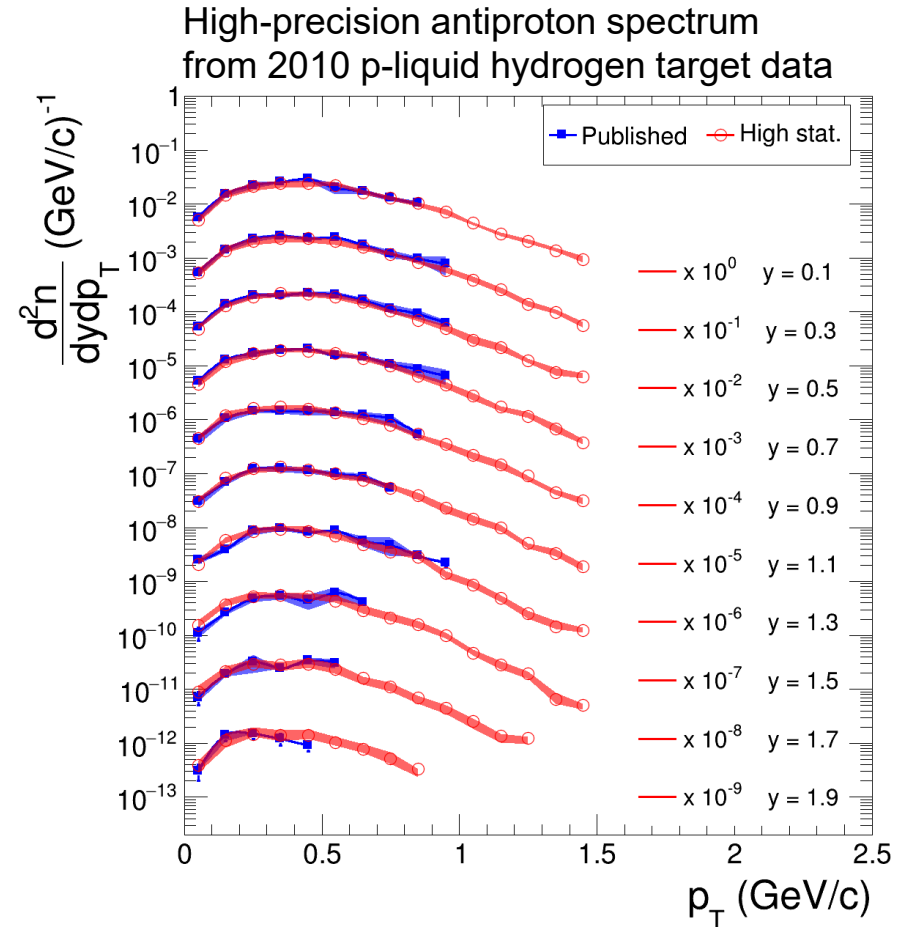
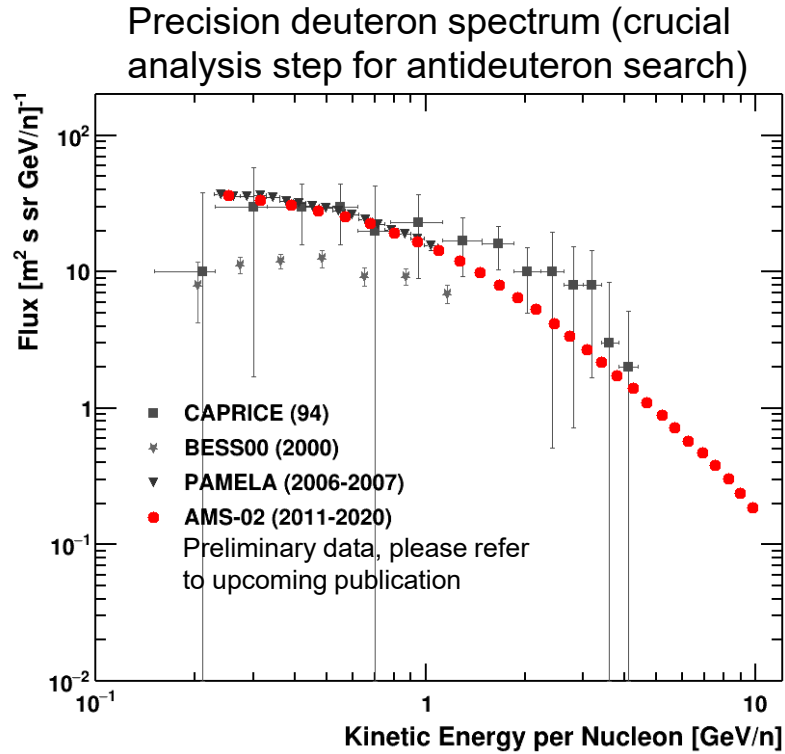
FY21: 45 LEAPS-MPS Ascend Awardees (4 in PHY)

FY22: 54 LEAPS-MPS Awardees (5 in PHY)

Including Jason Fry Eastern KY Univ:
Precise measurements of neutron beta decay parameters (N_{ab}) and the free neutron lifetime (BL3) & mentoring 1st gen college students

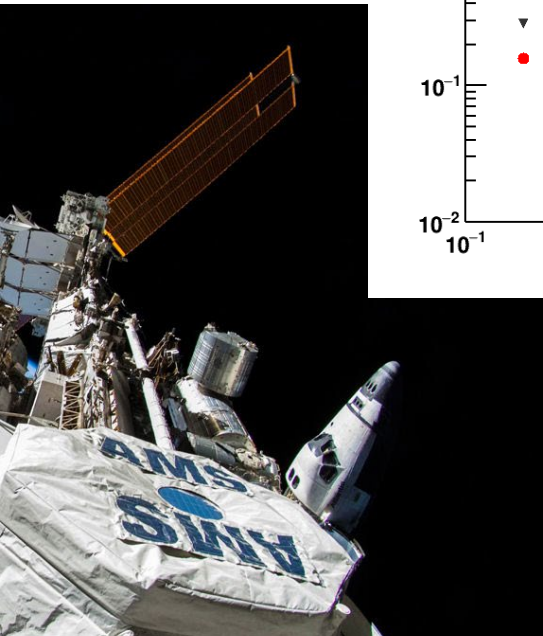


Cosmic-ray Antinuclei as Messengers of New Physics

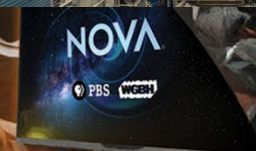


Goals:

- Search for cosmic antinuclei
- Improve (anti)nuclei formation models
- Use cosmic antinuclei as messengers for new physics



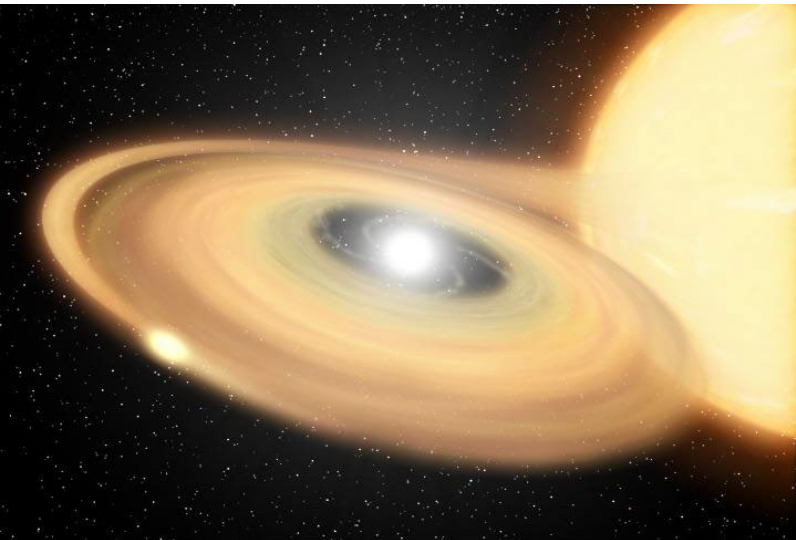
PI: von Doetinchem
U of Hawaii



Classical Novae and Nuclear Thermometers

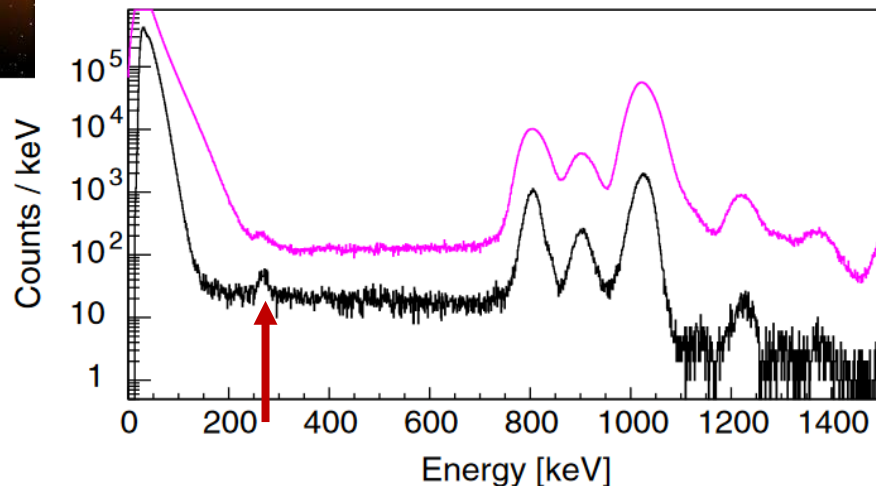


Compact WD accretes matter from companion → nova → new nuclei ejected

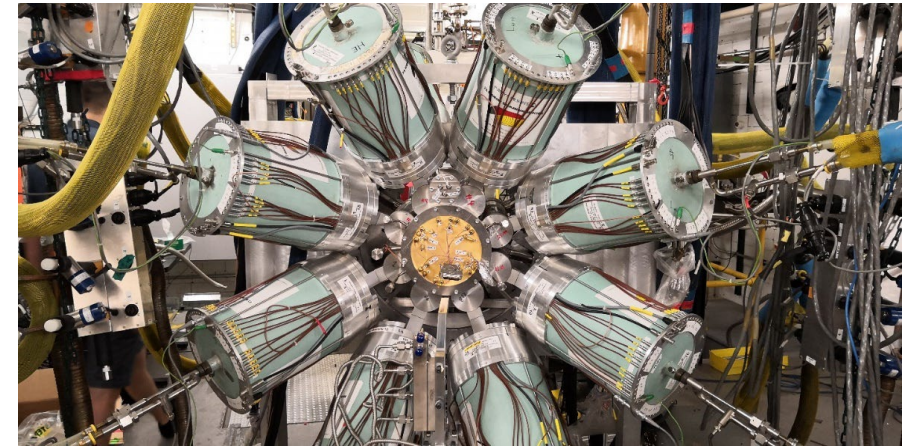


$^{30}\text{P}(p,\gamma)^{31}\text{S}$ = bottleneck for $A > 30$
dominated by p-capture on g.s.
but many low-lying resonances →
significant uncertainty

To the rescue:
 ^{31}Cl β -delayed p-decay thru ^{31}S resonance



GADGET: designed to measure p-branching ratio of $^{30}\text{P}(p,\gamma)^{31}\text{S}$ 260 keV res using ^{31}Cl β -delayed p-decay



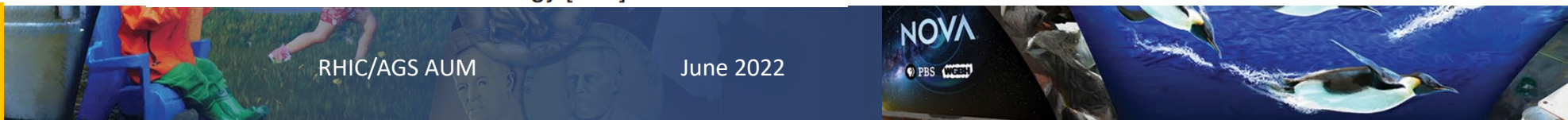
New $^{30}\text{P}(p,\gamma)^{31}\text{S}$ rate + 1D hydrodynamic nova model →

- factor of 2 – 4 improvement in accuracy of 4 nova thermometers
- $^{30}\text{Si} : ^{28}\text{Si}$ from WD novae greater than solar ratio.



MICHIGAN STATE UNIVERSITY

T. Budner, et al., PRL 128, 182701 (2022)

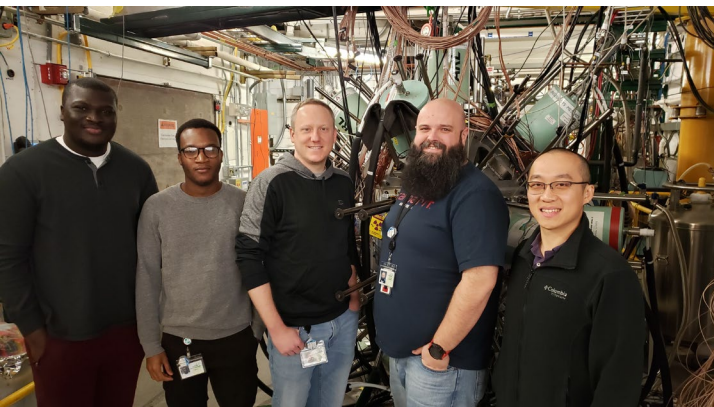


RHIC/AGS AUM

June 2022

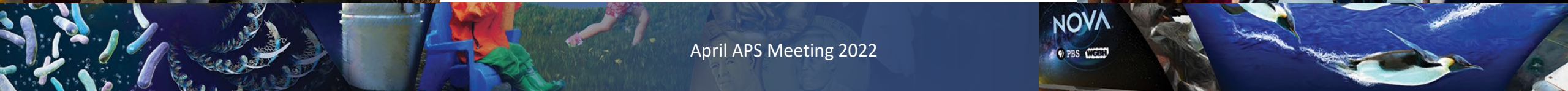
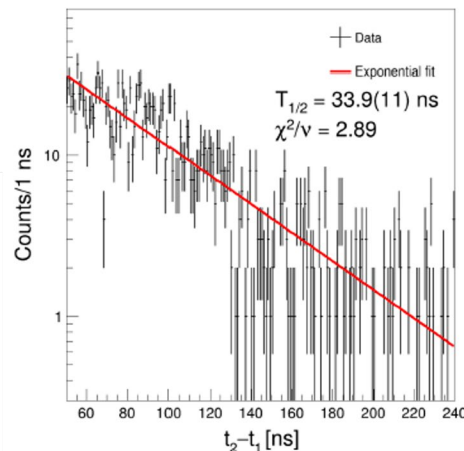
DEI Activities Within Research Awards

- Ben Crider @ Mississippi State University
 - Determine properties of exotic, neutron-rich nuclear systems predicted to exhibit multiple shapes
 - Training and mentoring a diverse group of undergrad and grad students → prepared for STEM careers
 - Physics summer school experience for students with Autism Spectrum Disorder in Mississippi → new generation of highly capable scholars



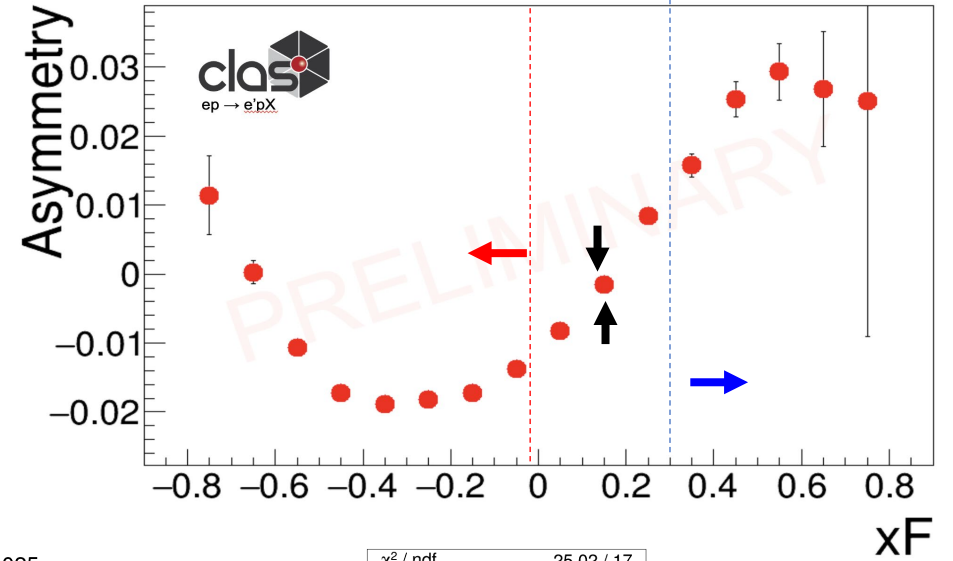
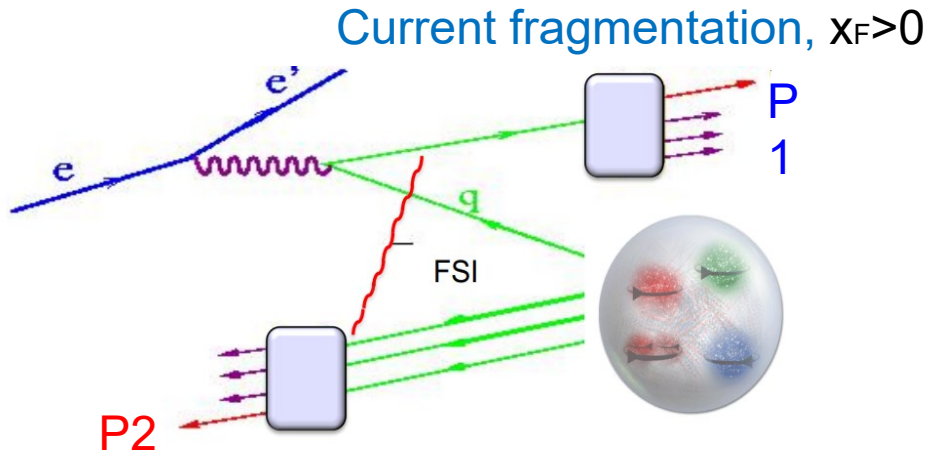
$34(1) \text{ ns } 1^+$ 199
 2^- 0

^{76}Ga

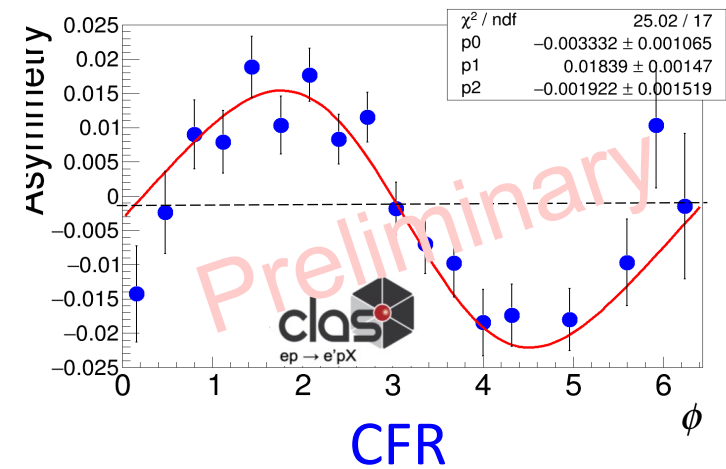
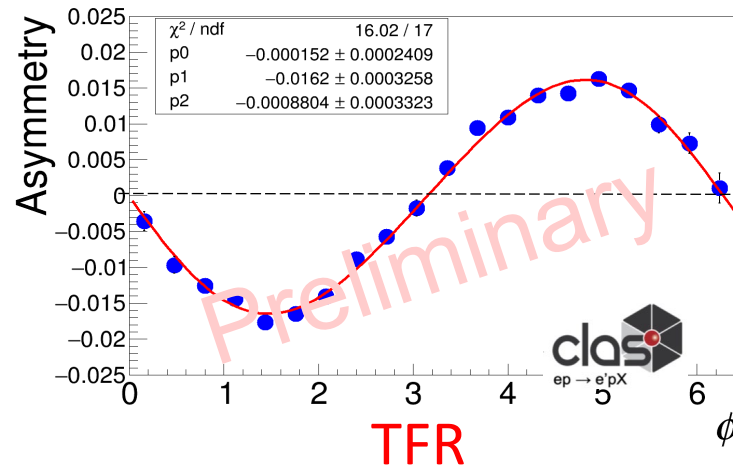


Studies of Partonic Distributions in the nucleon

- First Separation of Target and Current fragmentation regions in $ep \rightarrow epX$



Target fragmentation, $x_F < 0$



For the latest updates:

<https://www.nsf.gov/physics>

Contact us at:

- bmihaila@nsf.gov

or call (703)292-8235

- agalindo@nsf.gov

or call (703)292-5139

- aopper@nsf.gov

or call (703)292-8958

HOME FUNDING AWARDS DISCOVERIES NEWS PUBLICATIONS STATISTICS ABOUT NSF FASTLANE

NSF National Science Foundation
Directorate for Mathematical & Physical Sciences (MPS)

QUICK LINKS

SEARCH

MPS HOME MPS FUNDING MPS AWARDS MPS DISCOVERIES MPS NEWS ABOUT MPS

Physics (PHY)

Email Print Share

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 \(NSF 13-118\)](#)

PHY Home
[About PHY](#)
[Funding Opportunities](#)
[Awards](#)
[News](#)
[Events](#)
[Discoveries](#)
[Publications](#)
[Career Opportunities](#)
[Facilities and Centers](#)
[PHY Program Director Jobs](#)
[See Additional PHY Resources](#)
[View PHY Staff](#)

Search PHY Staff

MPS Organizations
[Astronomical Sciences \(AST\)](#)
[Chemistry \(CHE\)](#)
[Materials Research \(DMR\)](#)