



# National Science Foundation – Nuclear Physics

- ## Outline
- Staff in NSF/MPS/PHY
  - FY24 & FY25 Budget Info
  - Funding Announcements and Successes



Vicki Greene  
June 13, 2024

RHIC/AGS AUM





# NSF/MPS/PHY Personnel

No changes since December 2023!

- Sethuraman Panchanathan – Director
- Denise Caldwell – *Acting* Assistant Director for MPS
- Saúl González – Physics Division Director
- Michael Cavagnero – *Acting* Deputy Division Director
- Bogdan Mihaila – Nuclear Theory Program Director
- Senta (Vicki) Greene – Nuclear Physics Program Director
- Allena Opper – 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)



# FY24 Budget: President's Request, House, Senate (\$M)



| NSF by Account                                   | FY 2022<br>Actual | FY 2023<br>Estimate<br>Total | FY 2024<br>Request | House<br>Mark  | Senate<br>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> |



# FY24

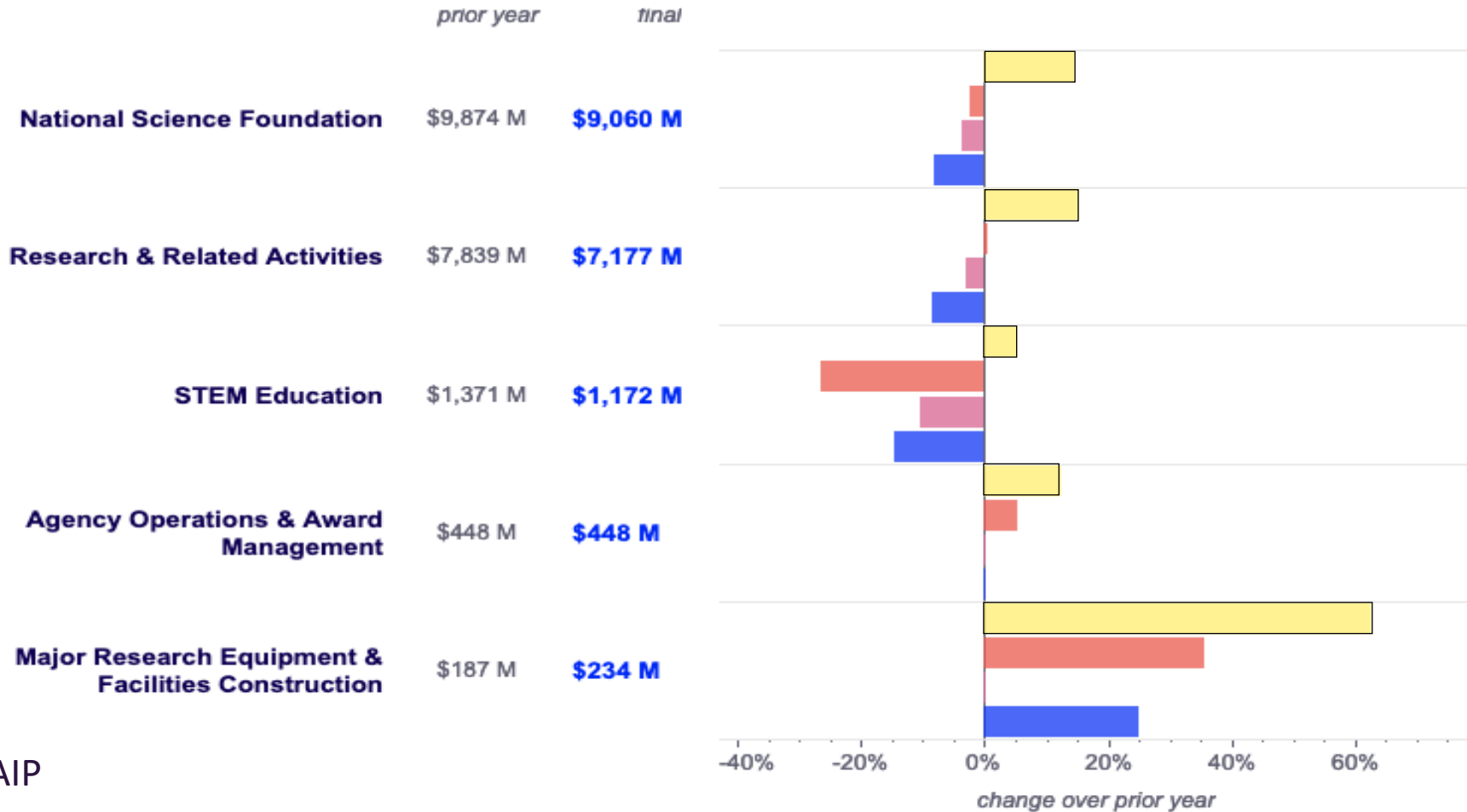
## FY2024 Appropriations: National Science Foundation



- REQUEST
- SENATE
- HOUSE
- FINAL

FISCAL YEAR

2024

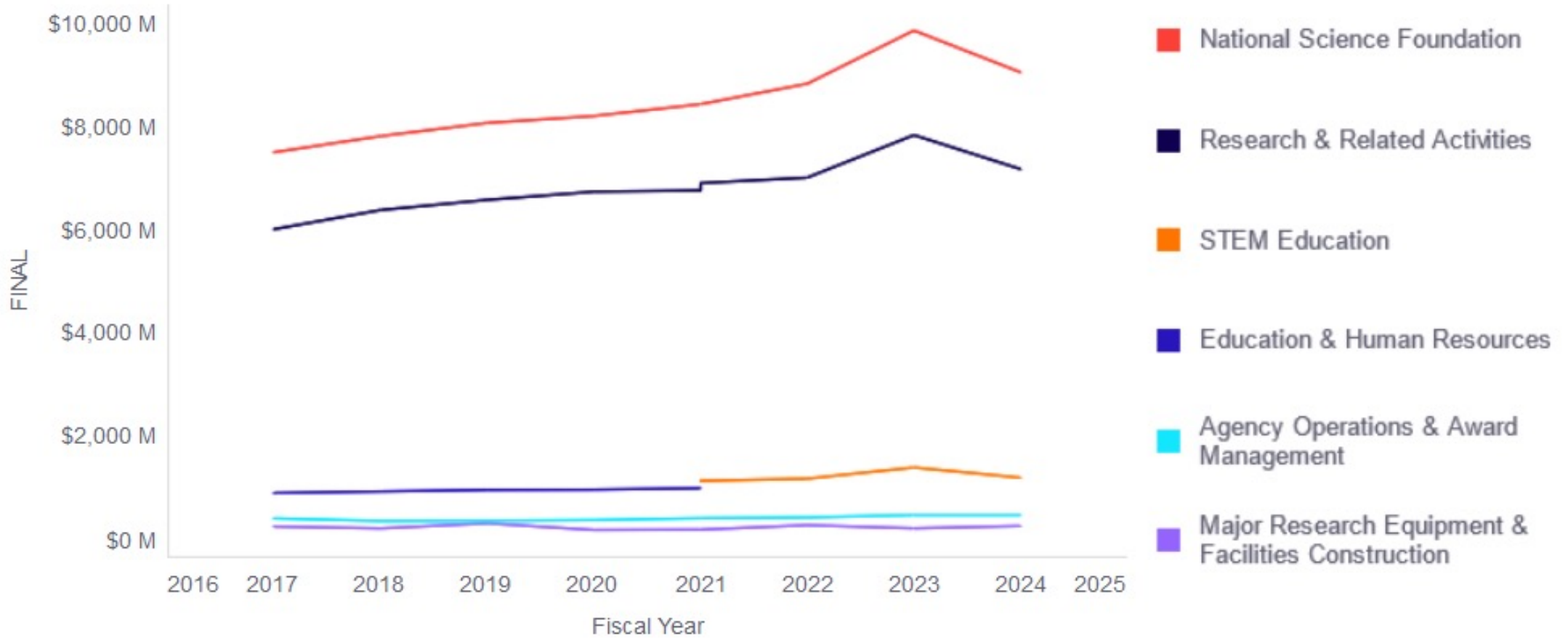


From AIP





# NSF Appropriations – figure from the AIP





# FY25 President's Budget Request – NSF (\$M)

| NSF by Account  | FY 2023<br>Base Plan <sup>1</sup> | FY 2024<br>(TBD) | FY 2025<br>Request | Change over<br>FY 2023 Base Plan |              |
|---|-----------------------------------|------------------|--------------------|----------------------------------|--------------|
|   |                                   |                  |                    | Amount                           | Percent      |
| <b>Research &amp; Related Activities<sup>2</sup></b>    | <b>\$7,631.02</b>                 | -                | <b>\$8,045.32</b>  | <b>\$414.30</b>                  | <b>5.4%</b>  |
| <b>STEM Education<sup>2</sup></b>                       | <b>\$1,229.28</b>                 | -                | <b>\$1,300.00</b>  | <b>\$70.72</b>                   | <b>5.8%</b>  |
| <b>Major Res. Equip. &amp; Fac. Construction</b>        | <b>\$187.23</b>                   | -                | <b>\$300.00</b>    | <b>\$112.77</b>                  | <b>60.2%</b> |
| <b>Agency Operations &amp; Award Mgmt.</b>              | <b>\$463.00</b>                   | -                | <b>\$504.00</b>    | <b>\$41.00</b>                   | <b>8.9%</b>  |
| <b>Office of Inspector General</b>                      | <b>\$23.39</b>                    | -                | <b>\$28.46</b>     | <b>\$5.07</b>                    | <b>21.7%</b> |
| <b>National Science Board</b>                           | <b>\$5.09</b>                     | -                | <b>\$5.22</b>      | <b>\$0.13</b>                    | <b>2.6%</b>  |
| <b>Total, NSF Discretionary Funding</b>                 | <b>\$9,539.01</b>                 | -                | <b>\$10,183.00</b> | <b>\$643.99</b>                  | <b>6.8%</b>  |
| Advancing Scientific Discovery: Artificial Intelligence | -                                 | -                | 50.00              | 50.00                            | N/A          |
| STEM Education - H-1B Visa                              | 192.54                            | -                | 138.93             | -53.61                           | -27.8%       |
| Donations   | 40.00                             | -                | 40.00              | -                                | -            |
| <b>Total, NSF Mandatory Funding</b>                     | <b>\$232.54</b>                   | -                | <b>\$228.93</b>    | <b>-\$3.61</b>                   | <b>-1.6%</b> |
| <b>Total, NSF Budgetary Resources</b>                   | <b>\$9,771.55</b>                 | -                | <b>\$10,411.93</b> | <b>\$640.37</b>                  | <b>6.6%</b>  |

Totals exclude reimbursable amounts.

<sup>1</sup> Reflects the anticipated transfer of \$15.0 M of carryover within R&RA to AOAM to be completed in FY 2024.

<sup>2</sup> FY 2023 R&RA and STEM Education accounts are restated to show consolidation of NSF mission support activities within R&RA comparably with FY 2025; STEM Education account shifts \$16.72 million to R&RA in FY 2023 display column.





# FY25 President's Budget Request – MPS (\$M)

|                                       | FY 2023           |          |                   | Change over       |             |
|---------------------------------------|-------------------|----------|-------------------|-------------------|-------------|
|                                       | Base              | FY 2024  | FY 2025           | FY 2023 Base Plan |             |
|                                       | Plan <sup>1</sup> | (TBD)    | Request           | Amount            | Percent     |
| Astronomical Sciences (AST)           | \$288.21          | -        | \$318.53          | \$30.32           | 10.5%       |
| Chemistry (CHE)                       | 264.99            | -        | 264.99            | -                 | -           |
| Materials Research (DMR)              | 334.50            | -        | 345.72            | 11.22             | 3.4%        |
| Mathematical Sciences (DMS)           | 248.40            | -        | 248.40            | -                 | -           |
| Physics (PHY)                         | 308.65            | -        | 312.90            | 4.25              | 1.4%        |
| Office of Strategic Initiatives (OSI) | 215.20            | -        | 191.09            | -24.11            | -11.2%      |
| <b>Total</b>                          | <b>\$1,659.95</b> | <b>-</b> | <b>\$1,681.63</b> | <b>\$21.68</b>    | <b>1.3%</b> |





# FY 2025 BUDGET REQUEST TO CONGRESS



U.S. National Science Foundation



## STRENGTHENING ESTABLISHED NSF

Driving discovery and enhancing state-of-the-art research capabilities are and will continue to be NSF's central focus.



## INSPIRING MISSING MILLIONS

NSF will continue to scale up existing pathways into STEM fields for every demographic and socioeconomic group in every geographic region of the country.

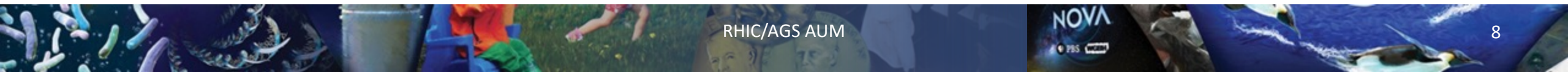


## ACCELERATING TECHNOLOGY AND INNOVATION

NSF will continue to support advancing breakthrough technologies, translating research results to the market and society, fostering partnerships, and nurturing diverse STEM talent.

### Four Major Themes

1. Advance Emerging Industries for National and Economic Security
2. Create Opportunities Everywhere
3. Build a Resilient Planet
4. Strengthen Research Infrastructure







# Early Faculty Career Development Program (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.
- Eligibility – must be untenured assistant professor in position that is at least 50% tenure-track
- Required department chair may not be a letter of support; should
  - Affirm PI's pre-tenure status
  - Indicate that the proposed research and education objectives of the proposal are supported by and advance department's goals
  - Describe how proposed goals are related to mission of department and how dept will provide appropriate mentoring
- Submission through Research.gov or Grants.gov (not FastLane 😞)
- Deadline: Fourth Wednesday in July ⇒ **July 24, 2024**

**NSF 22-586**





# Major Research Instrumentation (MRI) NSF 23-519

- Three 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 15 – November 15, 2024, (a window of opportunity)
  - <https://www.nsf.gov/od/oia/programs/mri/>
  - <https://new.nsf.gov/funding/opportunities/major-research-instrumentation-program-mri>
  - *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

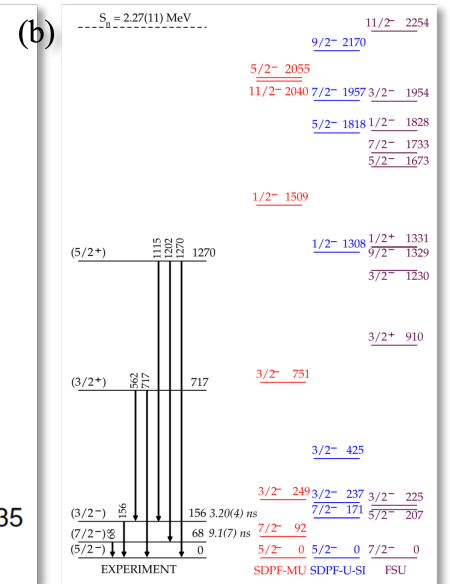
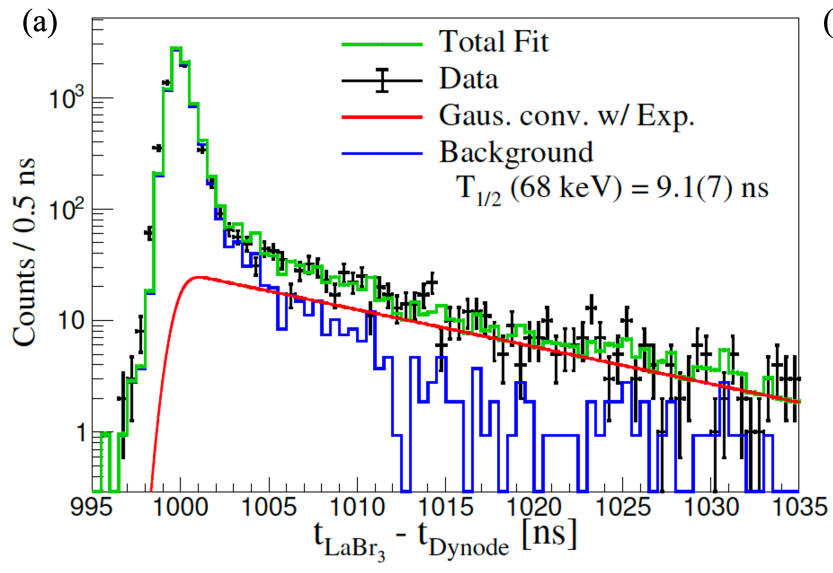
All proposals submitted to the Division of Physics programs must go through this solicitation.

- **Deadlines:** Second Tuesday in December for *Experimental & Theoretical Nuclear Physics*  
→ **December 10, 2024 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://new.nsf.gov/policies/pappg/24-1>
  - **Updated instructions regarding Current and Pending Support and Biographical Sketches of senior personnel**
- Submission through Research.gov or Grants.gov

**Questions – contact cognizant program director.**



# Selected Updates from Mississippi State University and PHY-1848177 (CAREER): PI Ben Crider



Newly observed 68-keV isomer found in  $^{37}\text{Si}$  using bg timing techniques (a), which validates SM predictions in neutron-rich, odd-A Si isotopes (b).

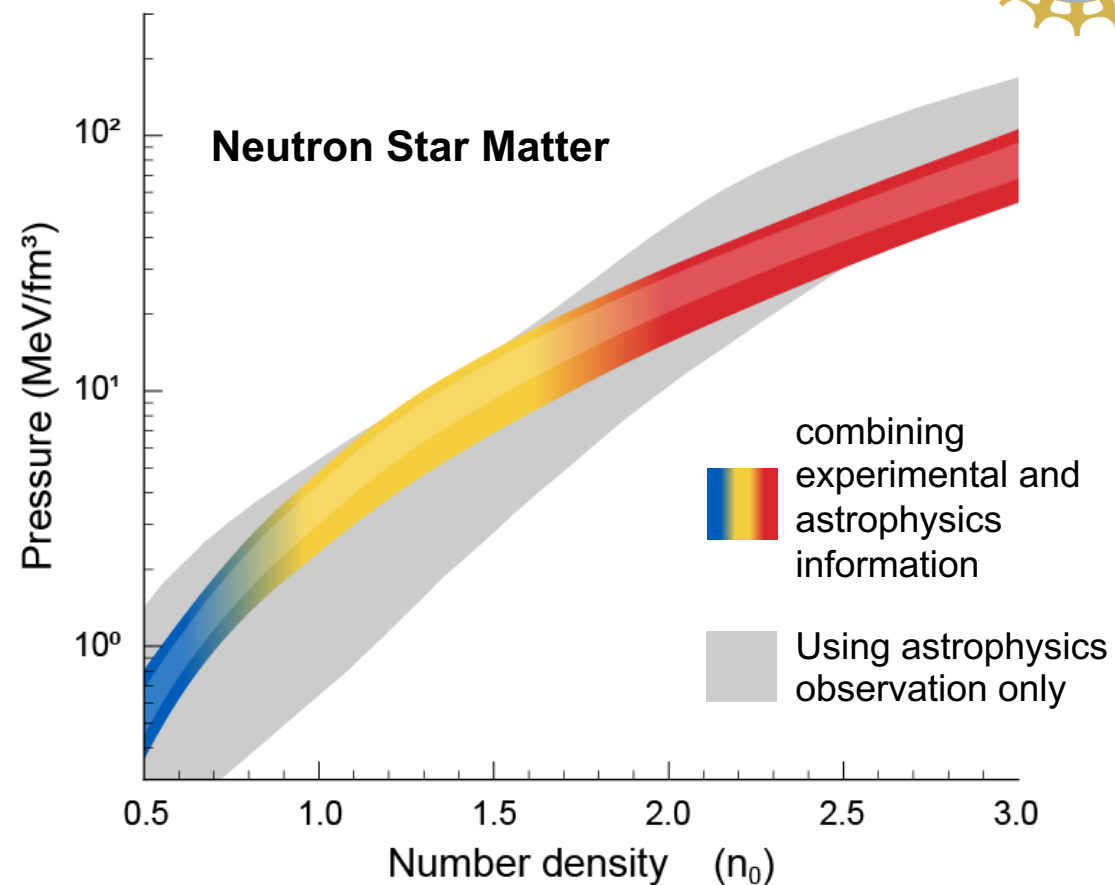
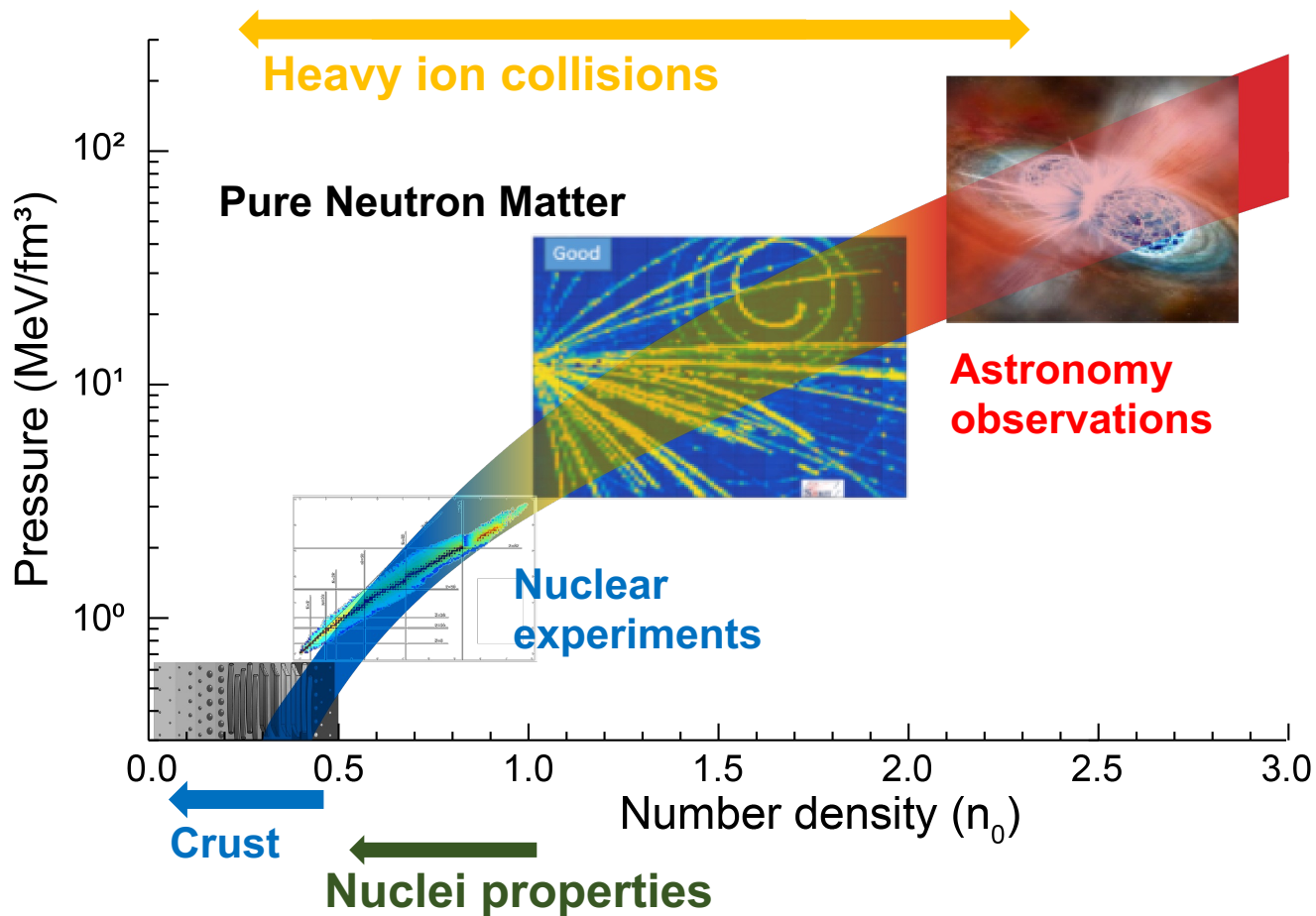


Year 2 of the Physics Summer Camp for Students with ASD was a big success! We nearly doubled the number of campers from year 1 to year 2 while maintaining a high degree of engagement with physics and STEM. We look forward to year 3 of the camp!

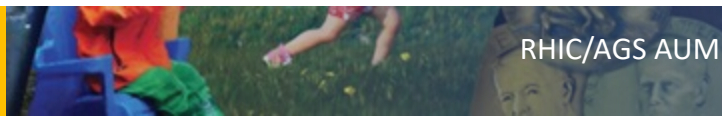
<https://www.physics.msstate.edu/physcamp>



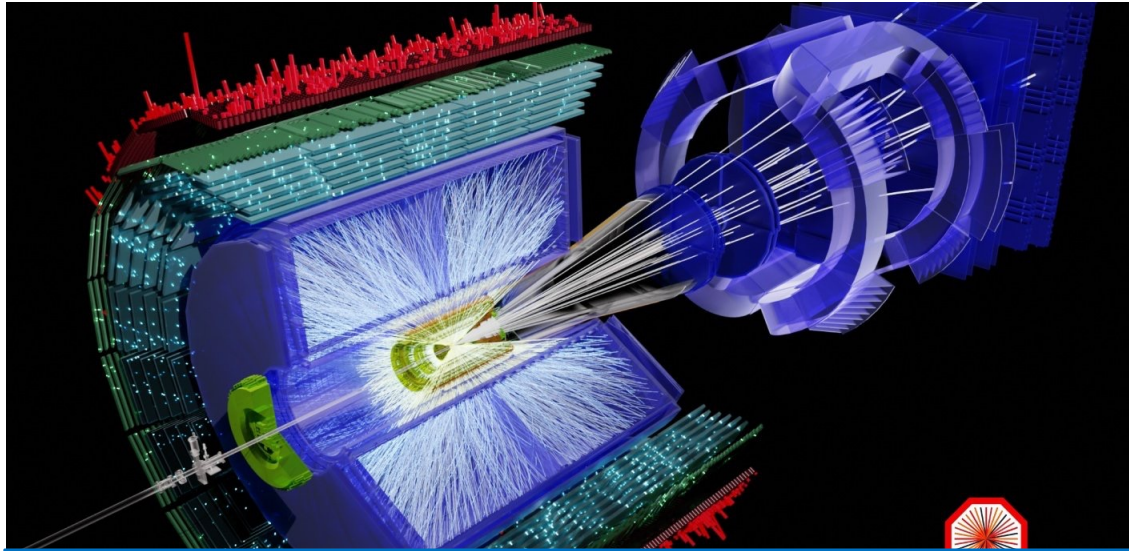
# Nuclear Physics Experiments and Astronomical Observations Advance Equation-of-State Research



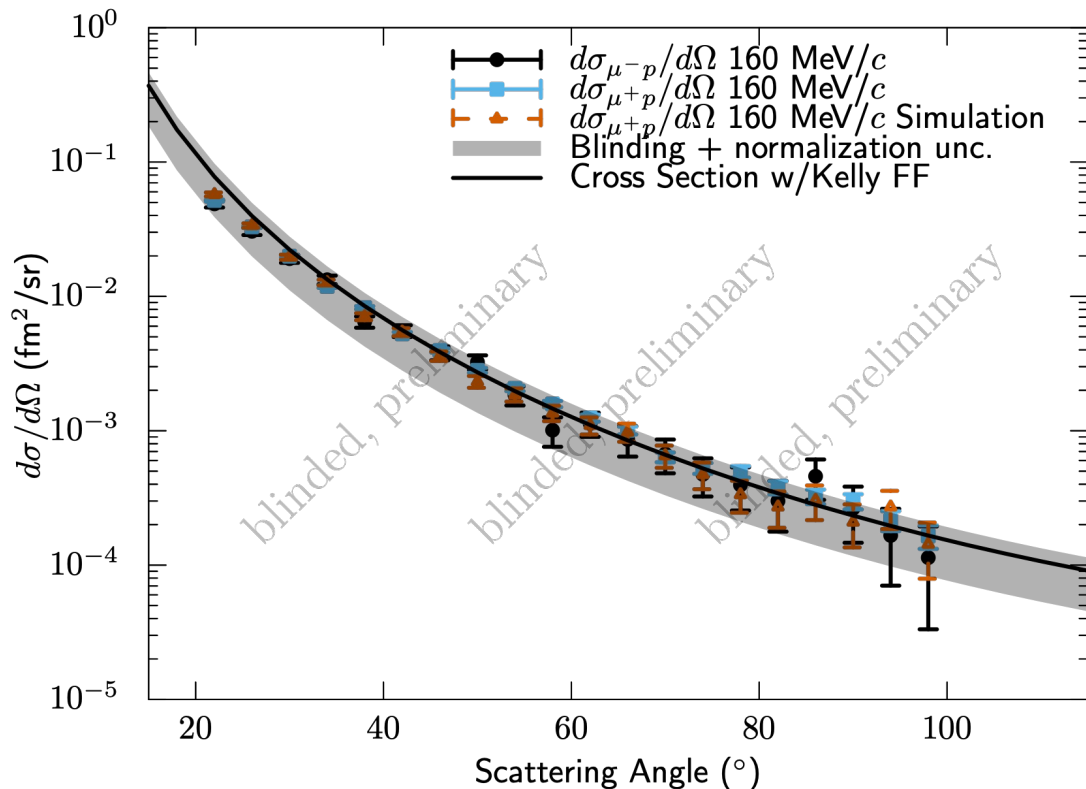
By combining astronomical observations and laboratory experiments, FRIB scientists extract nuclear matter equation of state over a wide range of densities shedding light on the neutron star properties. Incorporating nuclear physics data significantly reduces the uncertainties of the derived equation of state.



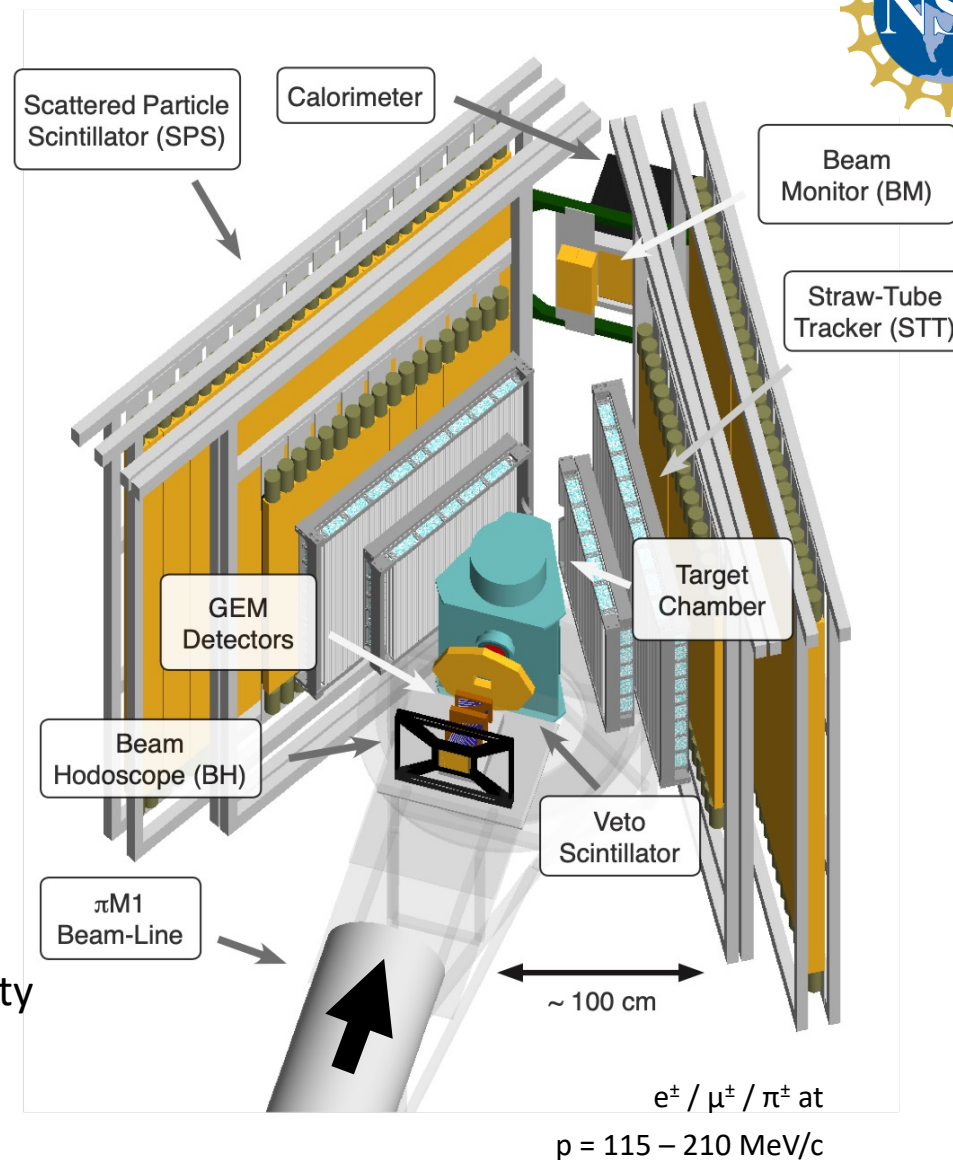
# RUI: Studies of Relativistic Heavy Ions Collisions in ALICE at the LHC



# MUSE Highlights

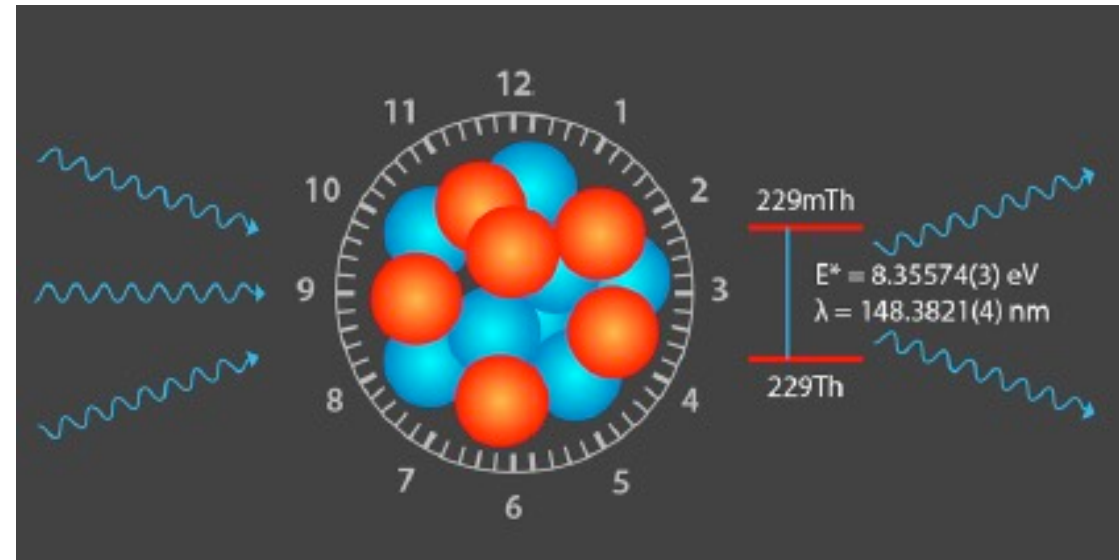


- Proton form factor, charge radius, two-photon exchange, lepton universality @ PSI elastic scattering of 115 – 210 MeV/c  $e^\pm, \mu^\pm$  from hydrogen
- 2024: 5 months beam time awarded and scheduled
- 2025: similar beam time expected



# Atomic Clock → Nuclear Clock!

- Current standard: atomic clock using hyperfine transitions of  $^{133}\text{Cs}$ 
  - $\delta = 10^{-16}$
- Nuclear Clock: transition of a nucleus
  - Less susceptible to EM perturbations
  - $\delta = 10^{-19}$
  - Challenge: radiation source more energetic than optical lasers
- European group: VUV laser  $^{229\text{m}}\text{Th}$
- Also observed by US groups
- Optical *nuclear* clocks ?





# For the latest updates:

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

Contact us at:

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- Allena Opper  
[aopper@nsf.gov](mailto:aopper@nsf.gov) or  
call (703)292-8958

An official website of the United States government [Here's how you know](#)

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Feedback



*Thank You!*

