The DOE Nuclear Physics SBIR/STTR Program

SBIR/STTR Exchange Meeting
August 13-15, 2024
Marriott Washingtonian

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Outline

- Expectations for Professional Conduct
- DOE SBIR/STTR goals, funding, organization, and administration
  - The Sequential Phase IIA, IIB, and IIC awards
- Exchange meeting goals and agenda
- NP SBIR/STTR proposal applications and awards metrics (FY 2024)
  - Impacts of funding allocation change
- The NP Mission and how it translates into SBIR/STTR Topics/Subtopics
- NP SBIR/STTR Phase III success
- DOE NP SBIR/STTR Program Updates
- Presentation Notes & Acknowledgement of Funding
- Conclusions

The SC statement on Diversity, Equity & Inclusion

The direct link is:
https://science.osti.gov/SW-DEI/DOE-Diversity-Equity-and-Inclusion-Policies
"The DOE Office of Science (SC) is fully committed to fostering safe, diverse, equitable, and inclusive work, research, and funding environments that value mutual respect and personal integrity. Effective stewardship and promotion of diverse and inclusive workplaces that value and celebrate a diversity of people, ideas, cultures, and educational backgrounds is foundational to delivering on the SC mission. The scientific community engaged in SC-sponsored activities is expected to be respectful, ethical, and professional.
The DOE SC does not tolerate discrimination or harassment of any kind, including sexual or non-sexual harassment, bullying, intimidation, violence, threats of violence, retaliation, or other disruptive behavior in the federal workplace, including DOE field site offices, or at national laboratories, scientific user facilities, academic institutions, other institutions that we fund, or other locations where activities that we support are carried out. …"

If you are being harassed at this meeting, see most senior DOE person or see this link to report a complaint
https://science.osti.gov/SW-DEI/DOE-Diversity-Equity-and-Inclusion-Policies/How-to-Report-a-Complaint

The DOE SBIR/STTR Program

SBIR: Small Business Innovation Research STTR: Small Business Technology TRansfer.

- SBIR: Set-aside program for U.S. small businesses (SB) to engage in Federal Research and Development (R&D) with potential for commercialization. (Participations: SB: minimum 66 % for Phase I and 50% for Phase II, Research Institution (RI): optional)
- STTR: Set-aside program to facilitate cooperative R&D between SB and U.S. RI with potential for commercialization. (Participations: SB: minimum 40%, RI: minimum 30%)
- "Both": submitted for consideration as SBIR or STTR (both). Must satisfy the minimum participation requirements listed above for both SBIR and STTR.
- Congressionally-mandated programs, funded by a small percentage of the extramural R&D budget set aside within each DOE technical program that participates.
- 2022 reauthorization bill has provided funding for the program until September 2025
- Specifies reviews for national security risks, cybersecurity and commercialization metrics

	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	-----	FY2024
SBIR	0.028	0.029	0.030	0.032	0.0320	0.0320	----	0.0320
STTR	0.004	0.0045	0.0045	0.0045	0.0045	0.0045	----	0.0045
Total	**3.20%**	**3.35%**	**3.45%**	**3.65%**	**3.65%**	**3.65%**	**----**	**3.65%**

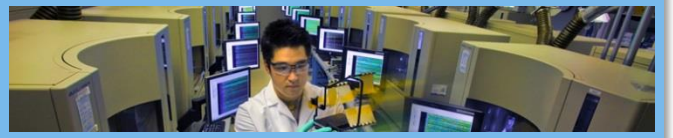
DOE SBIR/STTR Phases

Phase I: Feasibility, Proof of Concept
- Award Amount: $200,000 (guideline), $250,000 (max.)
- Project Duration: 12 months

Phase II: Continue R/R&D for Prototypes or Processes
- Award Amount: $1,100,000 (guideline), $1,600,000 (max.)
- Project Duration: 2 years

Sequential Phase IIA or IIB: Continue R/R&D for Prototypes or Processes
- **Phase IIA: For certain prototypes, products, or processes that need more development**
- **Phase IIB: For R&D funding required to transition and/or innovation towards commercialization.**
- **Phase IIC: Commercialization – requires matching funds**
- Award Amount: $1,100,000
- Project Duration: 2 years

Phase III: Commercialization
- Federal or Private Funding (non-SBIR/STTR funds)
- No dollar or time limits



Slide modified from M. Oliver, SBIR/STTR Office

Phase I Funding Opportunity Announcements Participating DOE Programs (starting FY 2024)

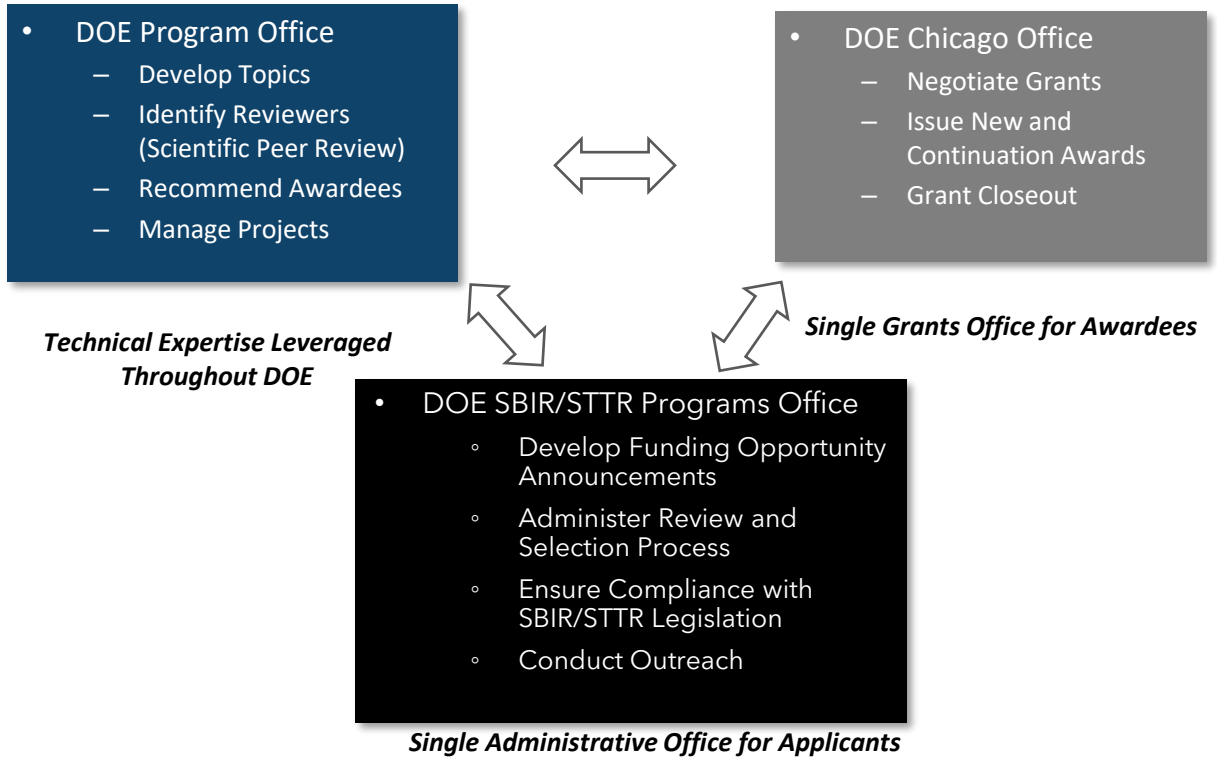
Phase I Release 1

- Office of Advanced Scientific Computing Research (ASCR)
- Office of Biological and Environmental Research (BER)
- Office of Basic Energy Sciences (BES)
- Office of Fusion Energy Sciences (FES)
- Office of High Energy Physics (HEP)
- **Office of Nuclear Physics (NP)**

Phase I Release 2

- Office of Cybersecurity, Energy Security, and Emergency Response (CESER)
- Office of Defense Nuclear Nonproliferation (NA)
- Office of Electricity (OE)
- Office of Energy Efficiency and Renewable Energy (EERE)
- Office of Environmental Management (EM)
- Office of Fossil Energy and Carbon Management (FECM)
- Office of Nuclear Energy (NE)

Organization of the DOE SBIR and STTR Programs



- NP recommends what R&D gets funded and deals with the technical evaluation of progress and approving final reports but is otherwise freed of much of the administration of those funds.
- Fees for this administration up 30% as a percentage of total funding relative to 2022(due diligence, diversity supplements and other initiatives)

Slide courtesy M. Oliver SBIR/STTR Office

Sequential II A, B, and C deciphering the alphabet

Since the 2012 SBIR/STTR Reauthorization agencies can issue sequential Phase II awards

- Only Phase II awardees are eligible
- At most, 2 additional sequential Phase II awards may be made per Phase II project

Invitation needed →

- **Phase IIA:** For certain prototypes, products, or processes that need more than a single Phase II award. Starts immediately upon completion of the Phase II.
  - *DOE NP Program Managers will select the topics/subtopics for which Phase IIA applications will be accepted (By subtopic invitation only)*

No Invitation needed →

- **Phase IIB:** For R&D funding required to transition an innovation towards commercialization. Starts immediately after completing a Phase II or up to 1 year later.
- **Phase IIC**: An R&D to improve commercialization outcome – requires equal match in funding (up to $1.1M) right after either a Phase IIA or Phase IIB

In the FY 2024 Phase II cycle: NP received 5 Ph IIAs, 2 Ph IIBs, and 0 Ph IIC applications. We funded no sequential proposals this fiscal year. As sequential IIA, B, and C compete with new Phase II applications, the success rate historically is usually lower.

Sequential Phase II timing

Sequential Phase IIA

Sequential Phase IIB

A Phase IIC immediately follows the Phase IIA or IIB

Slide: Courtesy of Dr. Manny Oliver

No Fund Extensions and Sequential Phase II Eligibility

- A company can only receive a Sequential Phase II award if their Phase II project has completed, meaning all funds expended.
  - Phase IIA applicants should generally not request no fund extensions past March of the FY in which they wish to apply for a Phase IIB
  - This is true of Phase IIB applicants as well.

The NP SBIR/STTR Exchange Meeting

- Started in FY2010, the Exchange Meeting is designed to achieve the following goals:
  - To **provide a platform** for small businesses to present the status of NP-supported Phase II grant work to the NP community and Federal Program Managers.
  - To offer an opportunity to **exchange information** regarding the **companies' capabilities** and the technical needs of the NP programs.
  - To **strengthen the ties** of the SBIR/STTR businesses **with the community** and enhance the possibilities for commercialization.
- For this year's meeting, all Phase II awardees at the end of Year-1, Year-2, (started in FY23 and 22) and awards still active or recently concluded under "no cost extension" are invited. A total of 36 SBIR/STTR PI presentations and 2 keynote presentations will be given in 3 days.
- There are also two Zoom "Breakout rooms", Lobby 1 and Lobby 2, where groups may have meetings – you can just select the breakout room and move to it, then return.
- FY 2024 Phase II awardees are invited as participants only and will be invited to present in the next two year's meetings.
- There will be a keynote talk by Dr. Manny Oliver, Director of the DOE SBIR/STTR Program Office on the 2nd day of the meeting.
- The optional get together to share commercialization strategies and success stories has returned. We'll gather in the meeting room after the first day's talks conclude and a short break.

2024 Exchange Meeting Agenda (Day 1)

Meeting Agenda-Day 1

Time (EDT)	Dur. (min)	Grant Title	Speaker	Organization	NP SBIR/ STTR Topic	Grant Status
Tuesday, August 13, 2024						
9:00 AM	0:03	Welcome and Introductory Remarks	Mantica, Paul	DOE, Office of Nuclear Physics		
9:03 AM	0:02	Welcome and Introductory Remarks	Farkhondeh, Manouchehr	DOE, Office of Nuclear Physics		
9:05 AM	0:40	NP SBIR/STTR Program Overview	Shinn, Michelle	DOE, Office of Nuclear Physics		
9:45 AM	0:25	Novel Insulators in Silicon-on-Insulator Substrates to Improve Nuclear	O'Connor, Kevin	Caporus Technologies, LLC, IL	Electronics	End Year 1
10:10 AM	0:25	High Performance Scintillator for Nuclear Physics Research	Datta, Amlan	CapeSym, Inc., Natick, MA	Instrumentation	End Year 2
10:35 AM	0:25	Coffee Break				
11:00 AM	0:25	Versatile, High-Density, High-Yield, Low-Capacitance 3D Integration for Nuclear Physics Detectors	Sonde, Sushant	Epir, Inc., IL	Electronics	End Year 1
11:25 AM	0:25	Inexpensive Low Noise Fast Switching DC High Voltage Power Supply	Sadwick, Larry	INNOSYS, INC., UT	Accelerator	End Year 2
11:50 AM	0:25	High-Density Glass with Tuned Scintillation/Cherenkov Response to	Horn, Tanja	Scintilex, LLC, VA	Instrumentation	End Year 2
12:15 PM	1:40	Lunch Break				
1:55 PM	0:25	A Multichannel DSP ASIC for Streaming Readout	Karnitski, Anton	Pacific Microchip Corporation, CA	Electronics	End Year 1
2:20 PM	0:25	Helium Flow Meter	Biallas, George	Hyperboloid LLC, VA	Accelerator	End Year 1
2:45 PM	0:25	Radiation Hardened Opto-atomic Magnetometer	Engelhart, Daniel	Hedgefog Research Inc., CA	Instrumentation	End Year 2/Ph IIA
3:10 PM	0:25	3D Printed Bimetallic Structures for Radio Frequency Devices	Bump, Maggie	Nanosonic, VA	Accelerator	End Year 1
3:35 PM	0:25	Coffee Break				
4:00 PM	0:25	High Performance Glass Scintillators for Nuclear Physics Experiments	Horn, Tanja	Scintilex, LLC, VA	Instrumentation	End Year 1/IIA
4:25 PM	0:25	High Performance High Current CW polarized photocathodes for Electron Ion Colliders	Vasudevan, Kannan	Structured Materials Industries, Inc., NJ	Accelerator	End Year 1
4:50 PM	0:15	Adjourn				
5:05 PM	60	Optional Gathering to Discuss Challenges and Best Practices for Commercialization				

2024 Exchange Meeting Agenda (Day 2)

Meeting Agenda-Day 2

Time (EDT)	Dur. (min)	Grant Title	Speaker	Organization	NP SBIR/ STTR Topic	Grant Status
Wednesday, August 14, 2024						
9:00 AM	0:25	Data Management for High Speed, Distributed Data Acquisition	Maggio, Jeffrey	SkuTek Instrumentation, NY	Software	End Year 2
9:25 AM	0:25	An ASIC with a Low Power Multichannel ADC for Energy and Timing	Karnitski, Anton	Pacific Microchip Corporation, CA	Electronics	End Year 2/Ph IIB
9:50 AM	0:25	Development and Testing of an Advanced HOM Absorber Design for SRF Accelerators Using Dielectric-Coated Cores	Arrieta, Victor	Ultramet, Pacoima, CA	Accelerator	End Year 2/Ph IIA
10:15 AM	0:25	High Output Pulsed Power Source	Smirnov, Alexander	Radiabeam Technologies, LLC., CA	Accelerator	End Year 2
10:40 AM	0:25	Coffee Break				
11:05 AM	0:25	Boron Nitride Nanotube Vibration Damping for SRF Structures	Whitney, Roy	BNNT, LLC, Newport News, VA	Accelerator	End Year 2/PIIA
11:30 AM	0:25	Organic Glass Scintillators for Nuclear Physics Experiments	van Loef, Edgar	Radiation Monitoring Devices, Inc., MA	Instrumentation	End Year 2
11:55 AM	0:25	Sheet Electron Probe for Beam Tomography	Cummings, Mary Anne	Muons, Inc., Batavia, IL	Accelerator	End Year 2
12:20 PM	1:40	Lunch Break				
2:00 PM	0:25	Large Volume Ring-Contact HPGe Detectors (RCD) for Low-Background	Hull, Ethan	PHDS Co., Knoxville, TN	Instrumentation	End Year 2
2:25 PM	0:25	Compact, low-cost higher order mode absorbers formed by cold spray of metal matrix composites	Carriere, Paul	Radiabeam Technologies, LLC., CA	Accelerator	End Year 2
2:50 PM	0:25	High Performance Scintillator and Beam Monitoring System	Friedman, Peter	Integrated Sensors, LLC, OH	Instrumentation	End Year 1/IIB
3:15 PM	0:40	Update on the Department of Energy SBIR/STTR Program, Q/A	Oliver, Manny	DOE, SBIR/STTR Office		
3:55 PM	0:25	Coffee Break				
4:20 PM	0:25	Design and Fabrication of the HDSoC- High Density Digitizer System-on-Chip	Mostafanezhad, Isar	Nalu Scientific LLC, HI	Electronics	Year 3/NCE
4:45 PM	0:25	A New Medium Field Superconducting Magnet for the EIC	Gupta, Ramesh	Particle Beam Lasers, Inc., CA	Accelerator	End Year 2
5:10 PM	0:25	Fast, Large Area Detector for Position and Energy Determination	Konovalov, Valeriy	Applied Diamond, Inc., DE	Instrumentation	End Year 2
5:35 PM	0:25	Scalable Micron-Sized Flexible Interconnects Enabled by Dielectric-Metal	Abbaspour, Reza	DUJUD LLC, GA	Electronics	End Year 2
6:00 PM	0:15	Adjourn				

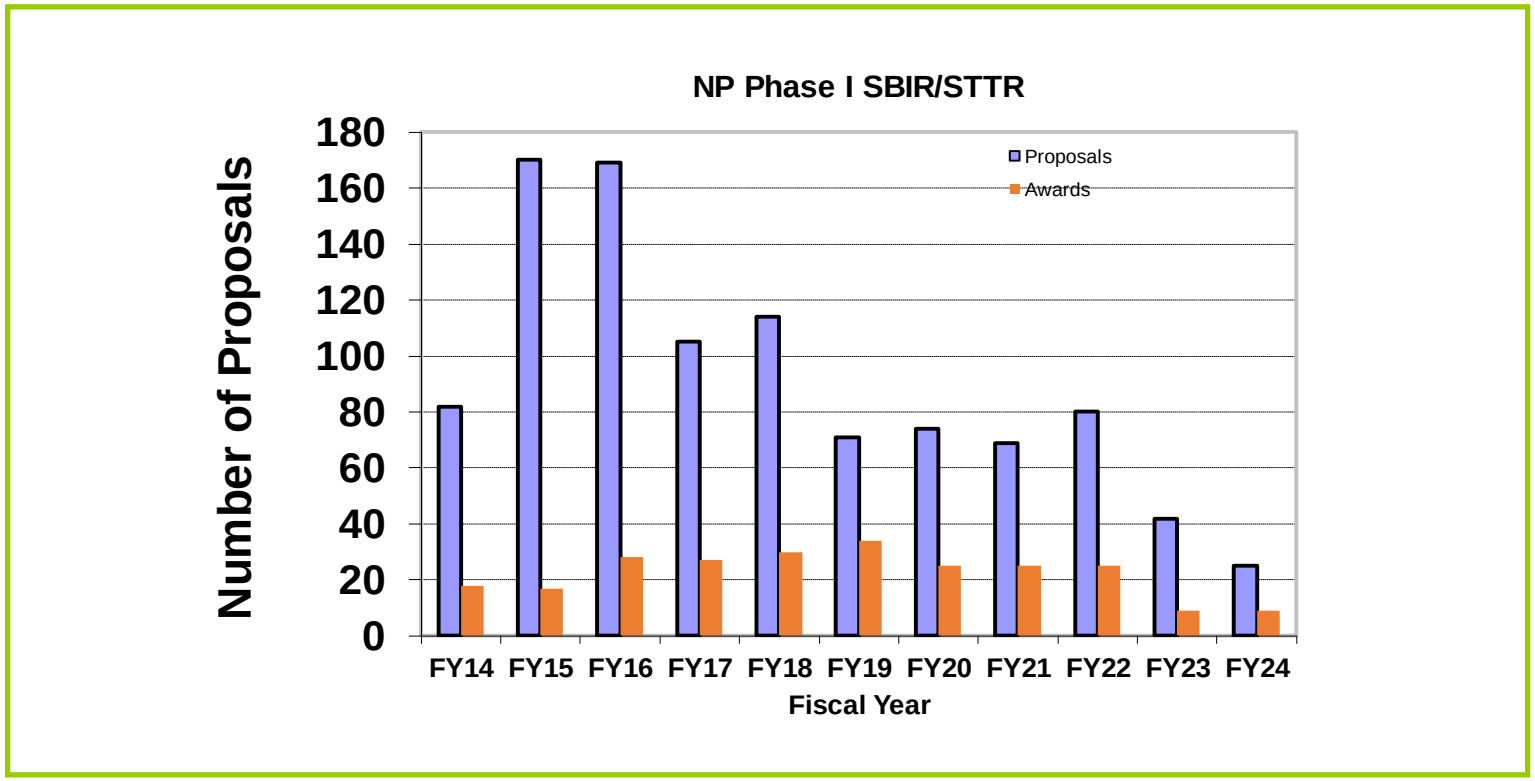
2024 Exchange Meeting Agenda (Day 3)

Meeting Agenda-Day 3

Time(EDT)	Dur. (min)	Grant Title	Speaker	Organization	NP SBIR/ STTR Topic	Grant Status
Thursday, August 15, 2024						
9:00 AM	0:25	Novel High Voltage Cryogenic Breaks	Rey, Christopher	Energy to Power Solutions (e2P), FL	Accelerator	End Year 2
9:25 AM	0:25	High-Quality Conductive Bellows Coatings Using Conformal Ionized PVD To Replace Unreliable Electroplating Processes	Stubbers, Robert	Starfire Industries LLC, IL	Accelerator	End Year 2
9:50 AM	0:25	High Performance FPGA-based Embedded System for Decision Making in Scientific Environments	Sun, Yu	Sunrise Technology, Inc, NY	Software	End Year 3/ASCR cofunc
10:15 AM	0:25	Additively Manufactured Z-Channel Detectors for Heavy Ion Accelerator	Moore, Jerome	Robot Nose Corporation, IL	Accelerator	End Year 2/NCE
10:40 AM	0:25	Coffee Break				
11:05 AM	0:25	HOM Absorber Design for eRHIC ERL Cavity	Schultheiss, Tom	TJS Technologies, NY	Accelerator	End Year 3/IIA NCE
11:30 AM	0:25	Digital Data Acquisition with High Resolution and Linearity	Skulski, Wojtek	SkuTek Instrumentation, NY	Instrumentation	End Year 3/NCE
11:55 AM	0:25	Long-Term Radiation Rugged Rotary Vacuum and Water Seals in Heavy-Ion Accelerators	Lalli, Jennifer	NanoSonic, Inc., VA	Accelerator	End Year 3
12:20 PM	1:40	Lunch Break				
2:00 PM	0:25	Design and fabrication of the “AODS”: All-in-One Digitizer System-on-	Mostafanezhad, Isar	Nalu Scientific, LLC, HI	Electronics	End Year 3/NCE
2:25 PM	0:25	Resonant Polarimetry and Magnetometry	Roberts, Brock	Electrodynamic, NM	Accelerator	End Year 4/NCE
2:50 PM	0:25	An RF beam Sweeper for Purifying In-Flight Produced Rare Isotope Beams	Smirnov, Alexander	RadiaBeam Systems, CA	Accelerator	End Year 3/NCE
3:15 PM	0:25	A New Approach to Achieving High Granularity in Low-Gain Avalanche Detectors	Islam, Rafiqul	Cactus Materials, AZ	Electronics	End Year 4/NCE
3:40 PM	0:25	Coffee Break				
4:05 PM	0	Adjourn				

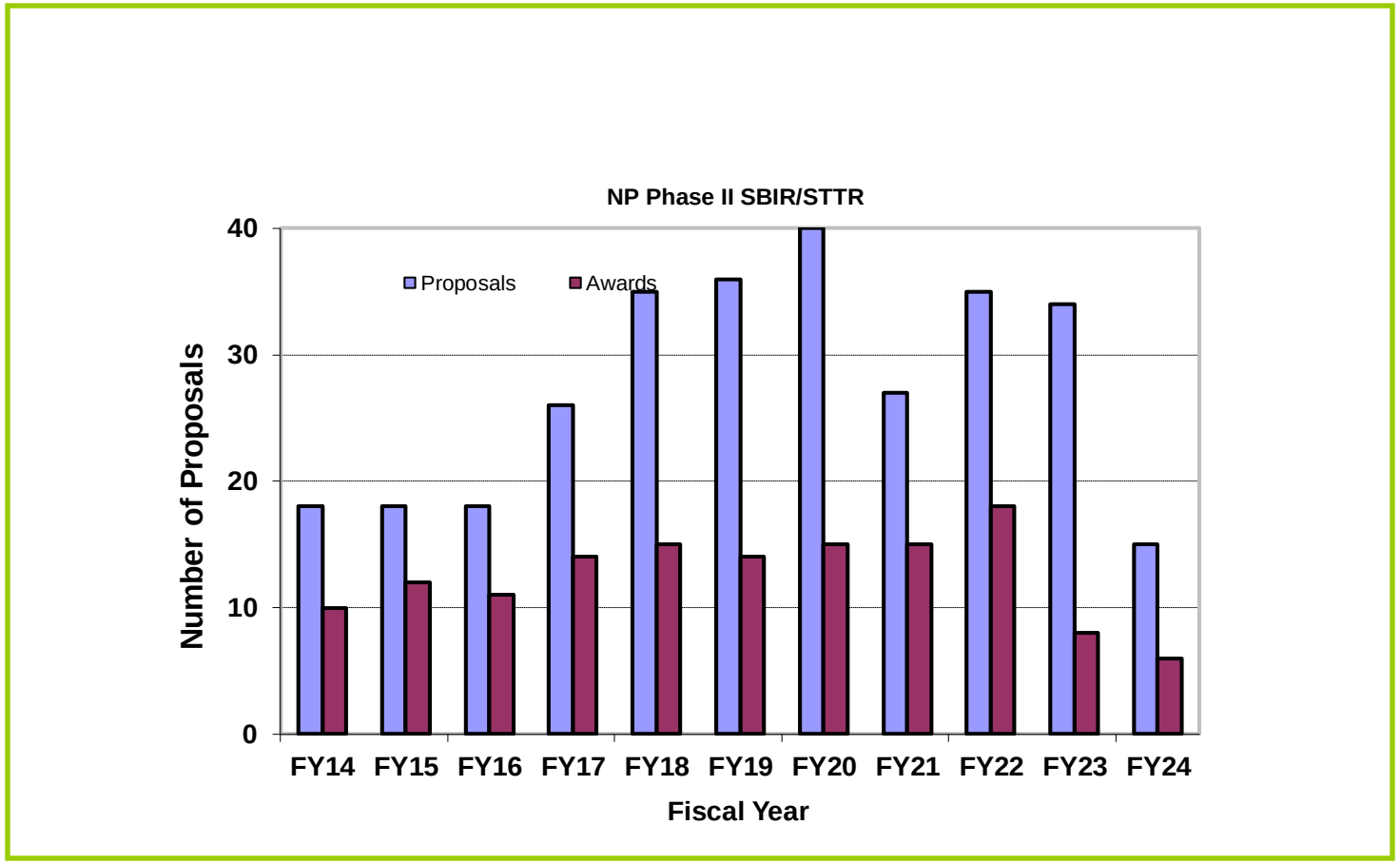
NP Phase I SBIR/STTR Applications and Awards

- NP received a total of **53** Letters of Intent and **25** phase I proposals in FY24. Total of **9** proposals funded (*cf* 9 in FY23 and 25 in FY21&FY22).



NP Phase II SBIR/STTR Applications and Awards

- FY24 saw a slight decrease in submissions over FY23. Under the new set-aside rules, awards decreased to 6. Was 9 in FY23.



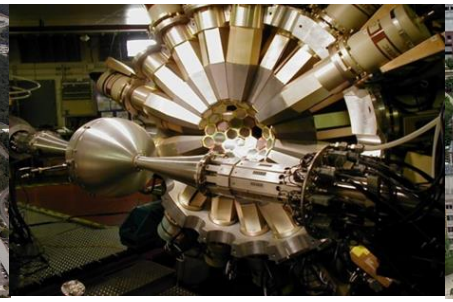
Nuclear Physics Mission

Discovering, exploring, and understanding all forms of nuclear matter

The Scientific Challenges

- The existence and properties of nuclear matter under extreme conditions, including that which existed at the beginning of the universe
- The exotic and excited bound states of quarks and gluons, including new tests of the Standard Model
- The ultimate limits of existence of bound systems of protons and neutrons
- Nuclear processes that power stars and supernovae, and synthesize the elements
- The nature and fundamental properties of neutrons and the neutrino and their role in the evolution of the early universe






How the NP Mission translated into programs for FY24

- NP's major program areas are:
  - Heavy Ion Nuclear Physics
  - Medium Energy Physics
  - Nuclear Structure-Nuclear Astrophysics
  - Fundamental Symmetries
  - Nuclear Theory

} Low Energy Nuclear Physics

- Accelerator Science and Technology is a major component that facilitates many of the NP subprograms.
- Within the program areas are two other subprograms, Nuclear Physics Computing and Nuclear Data, with communities we seek to serve.
- There is funding for QIS and AI/ML as Office of Science Crosscutting Initiatives

NP SBIR/STTR awards support these programs

Topics	Topic Associate
• Software and Data Management	G. Rai
• Electronics Design and Fabrication	M. Farkhondeh
• Accelerator Technology	M. Shinn
• Instrumentation, Detection Systems and Techniques	E. Bartosz

- Every year there is subtopic revision, based on community input.
- NP Program Managers are also given the opportunity to provide input or edit subtopics
- Requests are for perceived needs 5-7 years in the future
- Providing hardware and methods to advance initiatives recommended in the Long Range Plan for Nuclear Science are also important

NP's Phase III success

- As stated in the DOE SBIR/STTR FOA, SBIR/STTR Program Objectives, 3rd paragraph, "An important goal of the SBIR/STTR programs is the commercialization of DOE-supported research or R&D."
- To better achieve that goal, in 2019 I implemented program changes to ensure broader adoption of innovations by the NP communities that asked for them
  - Phase I proposals required a clear plan to have a prototype ready for testing in an NP application by the end of Phase II
  - Proposal reviewers thanked for their efforts and given links to the awards.
  - Initiated annual request that PIs provide Phase III and other sales information to provide metrics, *e.g.*, sales, to whom, and in response to what Topic. This also fulfills a request from the SBIR/STTR Office to provide Phase III info to the Small Business Agency. So, how's it gone?
- For 2018: 9 transactions, Phase III total of $2.33 M
- For 2023: 51 transactions, Phase II total of $7.68M
  - 2018 was the Phase II start year with highest number of entries

NP SBIR/STTR Program Updates – FY24/25

- In FY23 DOE-SC has changed the activities which are considered “extramural R&D” and subject to the set-aside to bring it into alignment with the rest of DOE

- Starting with the FY24 FOA there is explicit language explaining criteria used to make final decisions on proposals that are recommended for funding

  - Promoting Inclusive and Equitable Research (PIER) Plans required and part of review and scoring awards
  - Cybersecurity review for Phase II proposals

- For this year’s meeting –
  - Due to the many talks we will again not feature talks about future needs. Refer to 2021 keynote presentations as they are still current. https://science.osti.gov/np/Benefits-of-NP/SBIR-STTR/sbir-sttr-exchange-mtg-2021

Presentation Notes

- We have a tight agenda and must stay on time for each presentation.
- Sessions will start promptly at the time stated on the agenda.
- We will have your presentation file ready to display before the start of your talk.
- At Q&A time, please make your comments/questions short and use the coffee and lunch breaks for follow up. If attending virtually, we can assist providing virtual breakout rooms Lobby 1 & Lobby 2
- We will stop sharing your screen at the end of your allotted time. A timer will be visible on screen as an aid. A prompt will be on the podium for on site presenters.

Total presentation (min)	Presentation (min)	Q&A (min)	warning (minutes)
35	29	6	24
25	20	5	15

Acknowledging Funding in reports and presentations

- I've been returning a lot of final reports for lack of proper acknowledgement of support. As a reminder:

For peer reviewed and technical papers, the following acknowledgment of support is required:

For work directly supported by DOE Office of Science Financial Assistance (i.e., Grants and Cooperative Agreements):

- **Acknowledgment:** "This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of [insert the sponsoring SC Program Office, e.g., Basic Energy Sciences], [*Add any additional acknowledgements or information requested by the sponsoring SC Program Office*] under Award Number(s) [Enter the award number(s)]."

- **Example:** "This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics under Award Number DE-SC-000yyyy."

Follow this link:

- Acknowledgements of Federal Supp... | U.S. DOE Office of Science (SC) (osti.gov)

Conclusions

- NP uses the Congressionally-mandated SBIR/STTR Program –
  - To fund R&D that later becomes products that benefits the NP community
  - To build and sustain a US-based commercial infrastructure that serves society in areas other than nuclear science

- NP uniquely fosters connections between its community and the small businesses that serve it through the structure of its Topics and this annual meeting
  - Only Office with a dedicated SBIR/STTR webpage
  - This is becoming evident in the collaborations springing up between the PIs that attended past meetings
  - First Office of Science highlight from a collaboration between a National Lab and a small business.
  - Under review is a “1-pager” on the program to hand out to participants of meetings where DOE has a presence, or to DOE leadership, Congressional staff, etc.

Backup slides

Promoting Inclusive and Equitable Research (PIER) Plan

- SBIR/STTR Office page best resource
- https://science.osti.gov/sbir/Applicant-Resources/PIER-Plan
- All other SC grant opportunities required PIER plans in FY23
- The complexity and detail of a PIER Plan is expected to increase with the size of the small business, research team and the number of personnel to be supported
- See Notes sections for Phase I & Phase II submissions
  - Award sizes unaffected by PIER plans companies execute
- Will be evaluated and scored by merit reviewers
  - Original 3 evaluation criteria are still equally weighted. PIER plan score 10% weighting of the original 3