NP Accelerator R&D Principal Investigators Exchange Meeting

November 17, 20225

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Nuclear Physics Program

U.S. DEPARTMENT of ENERGY | Office of Science

Energy.gov/science

Outline:

- NP Accelerator R&D
- FY 2022 Accelerator R&D FOA and awards
- FY2023 AI/ML FOA awards- in Accelerator
- FY 2024 Accelerator R&D FOA and awards
- FY2026 Accelerator R&D
- Communications and Presentation Guidelines
- Acknowledgements of Federal Support for your award
- This Meeting

DOE Office of Nuclear Physics Accelerator R&D

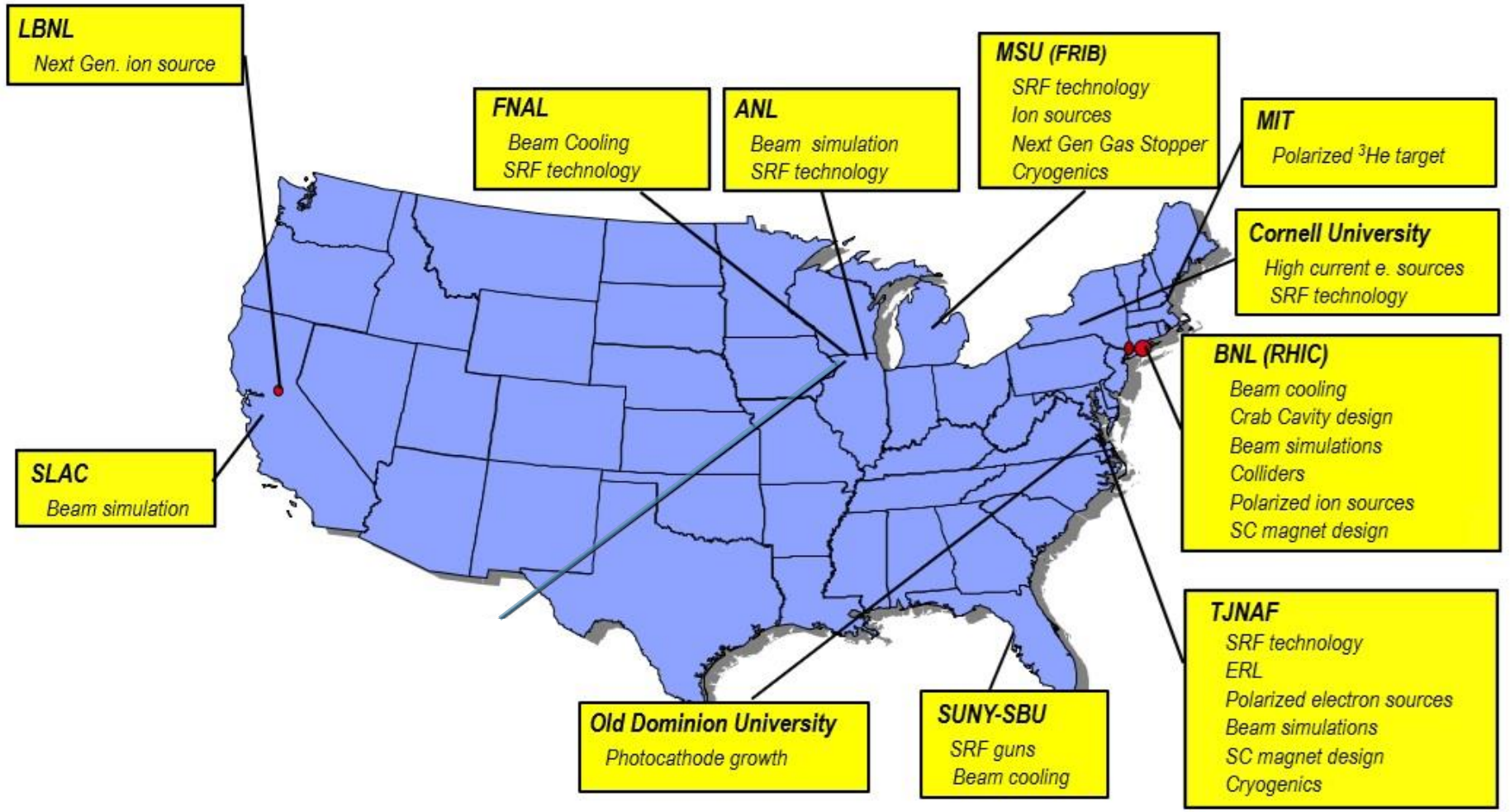
- Annual direct NP investment in accelerator R&D through the competitive funding opportunity announcement (FOA) and National Laboratory Accelerator R&D for FY2024-25 is on the order of $20 M per year.

- NP is also investing in non-EIC accelerator R&D with focus on key technology areas and in core competencies at NP laboratories

- NP published biennial FOAs with 2-year duration awards-2010-2024 last of which was in FY2024.

- NP Accelerator R&D supports for FY2026 and beyond will be through the annual SC open NOFO for universities and non-profits, and by inviting NP National Laboratories through Expressions of Interest (EOI). Non-NP Laboratories can collaborate with universities and NP Labs in these submissions.

Core Competencies at NP Labs and Universities



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- FY 2022 Accelerator R&D FOA and awards (under NCE)
- FY2023 AI/ML FOA awards- in Accelerator
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FY22 FOA: Accelerator R&D FOA Awards

Award #	Proposal ID	Institution	Proposal Title	Topic Area	New/ Existing Work	PI Name	Lead
1	0000267565	LBNL- 88 Inch	Development of a MARS superconducting cold mass for future generations of ECRIS	Next Gen Ion Source	New	Xie, Daniel	
2	0000267790	ODU/TJNAF	Enhancing the Design of Photocathodes with 90% polarization and QE > 1% for DOE NP	Pol Photocathode	Existing	Marsillac, Sylvain	ODU, TJ subcon.
3	0000267812	Cornell	Long lifetime spin-polarized electron sources: high current performance of alternative GaAs activation materials and novel spin-polarized sources via epitaxial growth	Pol Source	Existing	Bazarov, Ivan	
4	0000267656	ANL	A Practical Niobium-Tin Cavity for the ATLAS Superconducting Linac	SRF	Existing	Kelly, Michael	Lead
	0000267831	FNAL	Collaboration			Posen, Sam	
	0000267694	Radiabeam Technologies	Collaboration			Kutsaev, Sergey	
5	0000267691	TJNAF	In situ plasma processing of superconducting cavities	Plasma Processing	Existing	Powers, Tom	
6	0000267794	MSU	Development of Transformative Preparation Methods to Push up High Q&G Performance of FRIB Spare HWR Cryomodule Cavities	SRF Cryomodules	New	Saito, Kenji	
7	0000267789	BNL	Development of high current highly charged laser ion source	Laser Ion Source	New	Okamura, Masahiro	
8	0000267801	LBNL	Advanced Modeling of Beam Physics and Performance Optimization for Nuclear Physics Colliders	Beam dynamics modeling	New	Qiang, Ji	Lead
	0000267652	MSU	Collaboration			Hao, Yue	
	0000267677	BNL	Collaboration			Gu, Xiaofeng	
9	0000267811	TJNAF	1497 MHz Vertical Slice Test of Magnetron & Superconducting Cavity	RF sources		Jordan, Kevin	

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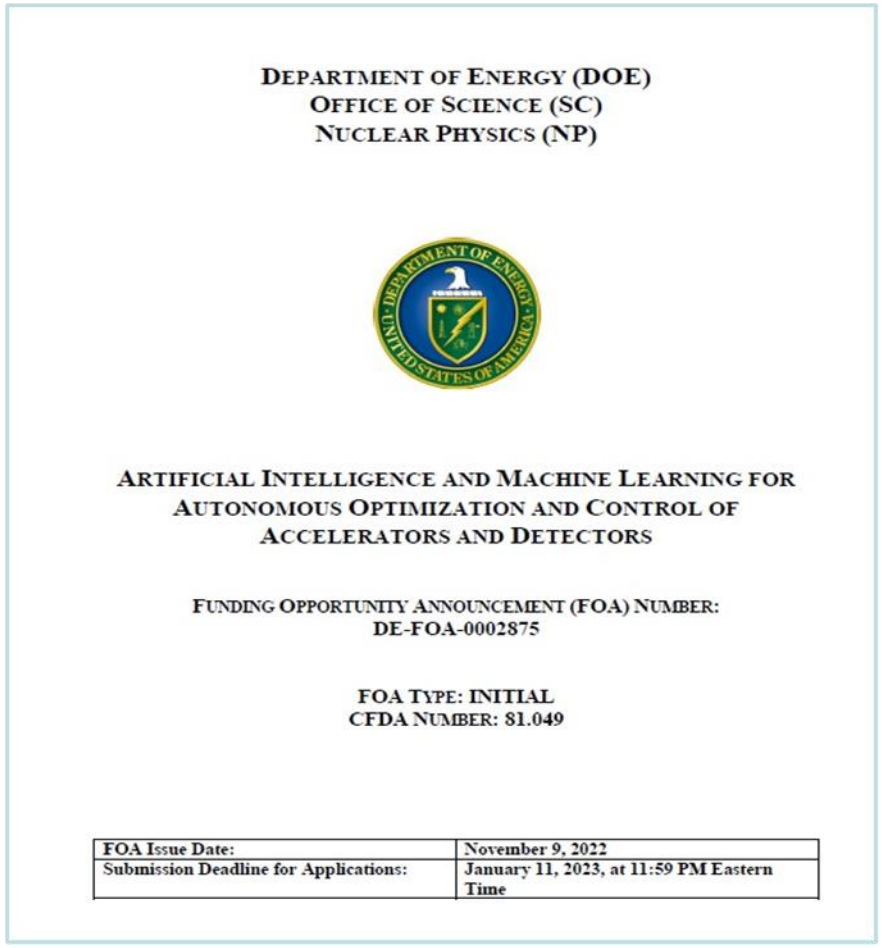
NP FY2023 AI/ML FOA DE-FOA-0002875

- FY2023 AI/ML General approach: Application of AI/ML tools and methods for experiments, simulation, theory and accelerator operation to expand scientific outreach

- *FOA: DE-FOA-0002875*
- *Issue Date: Nov 9, 2022*
- *Proposals due: Jan 11, 2023*
- *Total funding ~$16M FY23-24*

Proposal Topic	Submitted	Awarded
Accelerator	**11**	**4**
Detectors	8	4
Experiments + EIC	15	5
Theory	4	2
Totals	**38**	**15**



DEPARTMENT OF ENERGY (DOE)
OFFICE OF SCIENCE (SC)
NUCLEAR PHYSICS (NP)

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR AUTONOMOUS OPTIMIZATION AND CONTROL OF ACCELERATORS AND DETECTORS

FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:
DE-FOA-0002875

FOA TYPE: INITIAL
CFDA NUMBER: 81.049

FOA Issue Date:	November 9, 2022
Submission Deadline for Applications:	January 11, 2023, at 11:59 PM Eastern Time

FY23: AI/ML Awards in Accelerator R&D

- 4-5 awards in Accelerator related AI-ML applications

Topic Subj.	Proposal ID	Institution	Project Title	PI	
Accelerator	**271860**	**MSU**	**Online Autonomous Tuning of the FRIB Accelerator Using Machine Learning**	**Ostroumov, Peter**	
	271790	LANL		**Scheinker, Alexander**	
Accelerator Op	271872	ANL	**Use of artificial intelligence to optimize accelerator operations and improve machine performance**	**Mustapha, Brahim**	
Experiment and Accelerator ML	271770	LBNL	**Machine Learning Optimization: VENUS & GRETA**	**Crawford, Heather**	
Accelerator Op	271874	TJNAF /UVA subcon	**Graph Learning for Efficient and Explainable Operation of Particle Accelerators**	**Tennant, Chris**	
Accelerator	**271813**	**BNL**	**Beam polarization increase in the BNL hadron injectors through physics-informed Bayesian Learning**	**Hoffstaetter, Georg**	
	271830	Cornell		**Hoffstaetter, Georg**	
	271822	RPI, NY		**Wang, Yinan**	
	271869	SLAC		**Edelen, Auralee**	
	271834	TJNAF		**Schram, Malachi**	
				Total Accelerator $4.8M	**$4,770**

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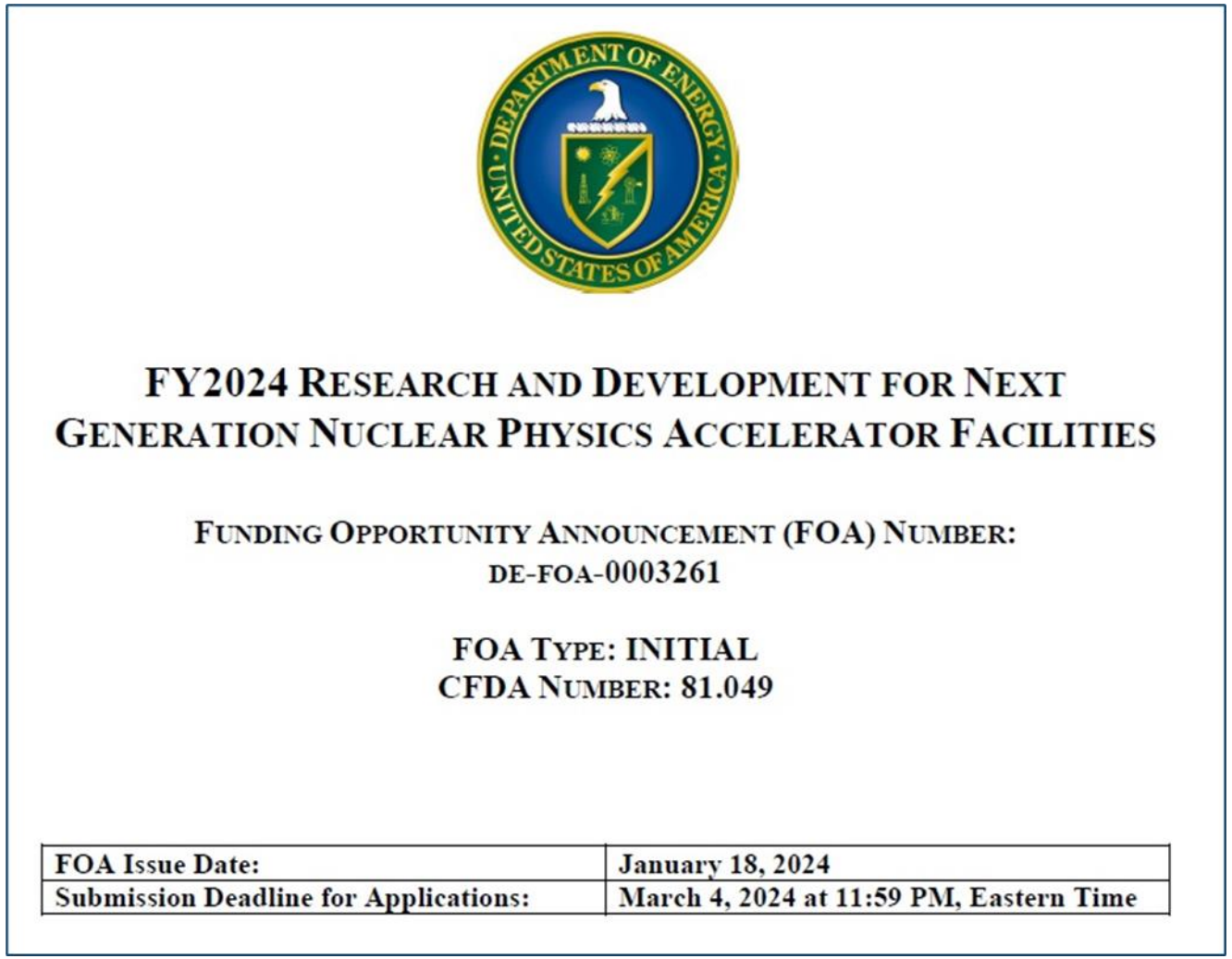
FY 2024 NP Accelerator FOA DE-FOA-0003261

- FOA: DE-FOA-0003261
- Issue Date: Jan 18, 2024
- Proposals due: March 4, 2024
- No LOIs or preapplications

- Subject of this year's presentations from this FOA

Number of Proposal	Submitted	Awarded
Applications	25	9



FY2024 RESEARCH AND DEVELOPMENT FOR NEXT GENERATION NUCLEAR PHYSICS ACCELERATOR FACILITIES

FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER:
DE-FOA-0003261

FOA TYPE: INITIAL
CFDA NUMBER: 81.049

FOA Issue Date:	January 18, 2024
Submission Deadline for Applications:	March 4, 2024 at 11:59 PM, Eastern Time

FY2024 NP Accelerator FOA DE-FOA-0003261

- Accelerator R&D in the following general categories:
  - Accelerator R&D that significantly advances the state-of-the art accelerator capabilities of relevance to next generation machines for the study of nuclear physics.
  - Accelerator R&D that significantly advances the state-of-the art accelerator capabilities of relevance to improving the performance of existing facilities studying nuclear physics.
- Proposals in the following areas were particularly encouraged:
  - Transformative accelerator R&D in SRF technology for restoring cryomodule performance at SRF-based accelerator facilities.
  - Transformative accelerator R&D in next generation ion and electron sources.
- Application requirements:
  - Eligible Institutions: Universities/colleges, non-profit and small business as collaborators, DOE/NNSA labs
  - Estimated award size/duration: Up to $1.0M/year; Award duration: 2 years
    - Estimated total funding: up to $8M over two years (~$4.6 in FY 2024). Actual FY204: $3.7M total
- Reviews and Awards:
  - Panel reviewed: April 29-May 2, 2024
  - Total Applications: 25, 2 collaborative, 23 single institutions
  - Number of awards: 9

FY2024 NP Accelerator FOA Awards

- Subjects of this year's Exchange meeting presentations

	NP FY2024 Accelerator R&D DE-FOA-0003261 and invited proposal awards			
#	Proposal ID	Institution	Proposal Title	PI
1	0000280525	LBNL	Development of a MARS superconducting cold mass for future generations of ECRIS	Todd, Damon
2	280493	ODU sub/ w TJNAF	Fabrication of Spin Polarized Electron Sources with High Polarization and QE for DOE NP	Marsillac, Sylvain
3	0000280552	MSU	Research and Development of a Solid-Stopper for the Facility for Rare Isotope Beams (SOL)	Camargo Villari, Antonio
4	0000280528	MSU	Development of Novel Diagnostics and Tuning Techniques for High-Intensity Multiple-Charge Heavy-Ion Beams in Accelerators	Ostroumov, Peter
5	0000280558	Cornell U	Testing of polarized and unpolarized photocathodes with high average current at the enhanced HERACLES facility at Cornell University	Bazarov, Ivan
6	280519	TJNAF	In Situ Plasma Processing of Superconducting Cavities	Powers, Thomas
7	280527	TJNAF	Develop a high-power, continuous beam positron target	Covrig Dusa, Silviu
8	280544	ANL	Toward Ion Linac Accelerators Based on Niobium-Tin	Kelly, Michael
	0000280555	FNAL	same	Eremeev, Grigory
	0000280294	Radiabeam	same	Kutsaev, Sergey
9	280551	BNL sub w/ SNL	Superlattice structures with Distributed Bragg Reflector for intense spin polarized electron beams	Cultrera, Luca

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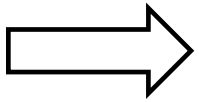
FY2026 Nuclear Physics Accelerator R&D-P1

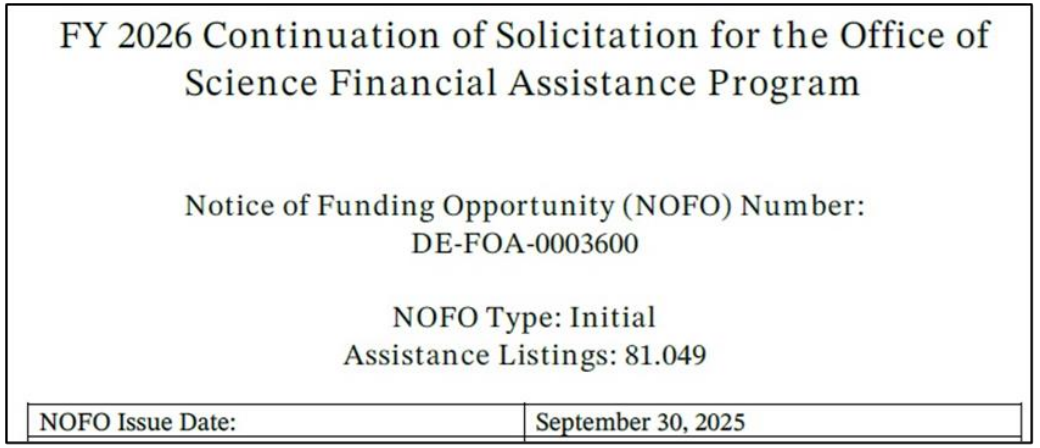
- Universities and non-Profits:
  - NP Accelerator R&D supports for FY2026 and beyond will be through the annual SC open NOFO for universities and non-profits : DE-FOA-00003600.
  - Duration of proposals: 1-3 years
  - Proposal due date: November 14, 2025
  -
- National Laboratories:
  - Base NP National Laboratory Accelerator R&D: non-competitive, NP program priorities
  - Competitive Accelerator R&D: National Laboratories are invited to submit Expressions of Interest (EOIs) for competitive accelerator R&D awards. EOIs will be evaluated internally by NP. The proponents of successful EOIs will be invited to submit full proposals. Collaboration with non-NP laboratories is permitted. All university and laboratory proposals will undergo panel evaluation for award selection.
  - Duration of proposals: 1-3 years
  - EOI due date: October 15, 2025
  - Proposals due date: ~44 days from date of positive EOI evaluation (December 10, 2025).

FY2026 Nuclear Physics Accelerator R&D-P2

- Proposed accelerator R&D activities should significantly advance the state-of-the-art capabilities relevant to 1) next generation machines for nuclear physics or 2) to improve the performance of existing nuclear physics facilities. Particularly, applications in the following areas are encouraged:
  - Transformative accelerator R&D in superconducting radiofrequency (SRF) technology for restoring cryomodule performance at SRF-based accelerator facilities. One example is R&D to establish practical and reproduceable in situ plasma processing techniques
  - High performance polarized electron photocathodes and polarized light ion sources with more-established methods and technologies.
  - Transformative accelerator R&D in next generation ion and electron sources.

Section (h) of FY2026 open NOFO: (h) Accelerator Research and Development for NP Facilities





FY 2026 Continuation of Solicitation for the Office of Science Financial Assistance Program

Notice of Funding Opportunity (NOFO) Number:
DE-FOA-0003600

NOFO Type: Initial
Assistance Listings: 81.049

NOFO Issue Date:	September 30, 2025

Outline:

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Communications between NP and PI

- Two modes of communications between PIs and NP office: Quarterly reports and an annual face to face meeting with all PI in one place.

- Quarterly Reports:
  - PIs were asked to submit quarterly reports to NP in a "Small Project" format. The FY2025 2th quarter was the last report NP requested.
  - **NP stopped requesting Quarterly reports** after 2nd quarter of FY2025.

- PI Exchange Meeting:
  - Accelerator R&D: Since 2015, NP conducts annual "PI Exchange" meetings with presentations on current status of work by all Principal Investigators who received awards under previous fiscal year funds.
  - AI/ML: Virtual AI/ML exchange meeting, November 19-20 to cover 15 FY2023 FOA awards and remaining awards from the FY2021 FOA

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PI Exchange Meeting, November 17- Virtual

- Presentations on status of work by all Principal Investigators (PIs) who received awards
  - All 9 FY 2024 FOA DE-FOA-0003261 awards
  - 3 FY 2022 FOA DE-FOA-0002670 awards still in progress

- This is not a review, and no review panel is involved. Presentations will be made to NP Office Program Managers and Division Directors, and possibly a few PMs from HEP and BES Program Offices.

- To facilitate exchange of information between PIs and the NP Office and among PIs and institutions on all current NP Accelerator R&D awards activities.

PI Meeting Presentation Guidelines:

- Each presentation should include the following information:
  - Description of the project and the current status;
  - The main goal of the project for which you received the FY 2024 awards,
  - A table showing annual budget and the total received to date (see below);
  - A table showing major deliverables and schedule; and
  - There will be no written report or follow up actions required for this meeting.
  - Summary of expenditures by fiscal year (FY):
  - All talks will be posted on PI Exchange meeting page on NP website.
  - **35 min talks should allow 7 min for Q/A.**

	Year 1	Year 2	Year 3	Totals
a) Funds allocated				
b) Actual costs to date				

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Acknowledgements of Federal Support for your award

- For peer reviewed and technical papers, the following acknowledgment of support is required:
- **For Financial Assistance** (Grants, etc.):
  - 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., Nuclear Physics], [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-000yyy."
- **For National Lab awards**:
  - Example: "This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office Nuclear Physics program under Award Number DE-SC-000zzz.

- Here is the link on Acknowledgment:
- https://science.osti.gov/Funding-Opportunities/Acknowledgements

Meeting Agenda

DRAFT AGENDA : 2025 NP Accelerator R&D PI Exchange Meeting, Monday, November 17, via Zoom Zoom

Link: https://science-doe.zoomgov.com/j/1603754427?pwd=MdlP8sY9bmk29HXhmMLovXazGWHazU.1

Meeting ID: 160 375 4427

Passcode: *j@7FJPE

Sequence #	Time (EST)	Dur. (min)	Principal Investigator	Institution	R&D Area	Presentation Title	Speaker(s)
	10:00 AM	5	-	DOE NP	-	Introductory Remarks	Mantica
	10:05 AM	35	-	DOE NP	-	NP supported Accelerator R&D and AI/ML	Farkhondeh
1	10:40 AM	35	Marsillac, Sylvain Poelker, Matthew	ODU TJNAF	Polarized electron Sources	Enhancing the Design of Photocathodes with 90% polarization and QE > 1% for DOE NP	Marsillac
2	11:15 AM	35	Bazarov, Ivan	Cornell	Electron Sources	Testing of polarized and unpolarized photocathodes with high average current at the enhanced HERACLES facility at Cornell University	Bazarov
	11:50 AM	**15**	**Break**				
3	12:05 PM	35	Cultrera, Luca	BNL / SNL-sub	Polarized electron Sources	Superlattice structures with Distributed Bragg Reflector for intense spin polarized electron beams	Cultrera
4	12:40 PM	35	Kelly, Michael Kutsaev, Sergey Grigory Eremeev	ANL RadiaBeam FNAL	SRF	A Practical Niobium-Tin Cavity for the ATLAS Superconducting Linac	Kelly
5	1:15 PM	35	Todd, Damon	LBNL-88 inch	Next Gen Ion source	Development of a MARS superconducting cold mass for future generations of ECRIS	Todd/Benitez
	1:50 PM	**40**	**Lunch**				
6	2:30 PM	35	Powers, Tom	TJNAF	Plasma Processing	In Situ Plasma Processing of Superconducting Cavities	Powers
7	3:05 PM	35	Ostroumov, Peter	MSU	Accelerator Diagnostics	Development of Novel Diagnostics and Tuning Techniques for High-Intensity Multiple-Charge Heavy-Ion Beams in Accelerators	Ostroumov
8	3:40 PM	35	Camargo Villari, Antonio	MSU	Solid stoppers	Research and Development of a Solid-Stopper for the Facility for Rare Isotope Beams (SOL)	Villari
9	4:15 PM	35	Covrig Dusa, Silviu	TJNAF	Positron target	Develop a high-power, continuous beam positron target	Corvig Dusa
	4:50 PM	**15**	**Break**				
			Accelerator R&D FY2022-2023 Awards -under No Cost Extension (NCE)**				
10**	5:05 PM	20	Jordan, Kevin	TJNAF	RF sources	1497 MHz Vertical Slice Test of Magnetron & Superconducting Cavity	Jordan
11**	5:25 PM	20	Okamura, Masahiro	BNL	Laser Ion Source	Development of high current highly charged laser ion source	Okamura
12**	5:45 PM	20	Qiang, Ji Hao, Yue Gu, Xiaofeng	LBNL MSU BNL	Beam dynamics modeling	Advanced Modeling of Beam Physics and Performance Optimization for Nuclear Physics Colliders	Hao/Qiang
	6:05 PM	5	Closing Remarks				
	6:10 PM		**Adjourn**				
**	**No Cost Extension**						

BACKUP SLIDES