U.S. DEPARTMENT OF ENERGY | Office of Science

Informational Webinar:

FUNDING FOR ACCELERATED, INCLUSIVE RESEARCH (FAIR)

DE-FOA-0002931

January 6, 2023

FOA Issue Date:	December 15, 2022
Submission Deadline for Pre-Applications:	February 7, 2023, at 5:00 PM Eastern Time
Pre-Application Response Date:	March 7, 2023, at 11:59 PM Eastern Time
Submission Deadline for Applications:	April 11, 2023, at 11:59 PM Eastern Time

https://science.osti.gov/Initiatives/FAIR

https://science.osti.gov/-/media/grants/pdf/foas/2023/SC_FOA_0002931.pdf

Disclaimer : *This presentation summarizes the contents of the FOA. Nothing in this webinar is intended to add to, take away from, or contradict any of the requirements of the FOA. If there are any inconsistencies between the FOA and this presentation or statements from DOE personnel, the FOA is the controlling document.*

DOE's Office of Science:
Meeting the Nation's Challenges Today and into the Future

The DOE Office of Science (SC) mission is to deliver the scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic, and national security of the United States.

Advancing the frontiers of science

Largest Federal supporter of basic research in the physical sciences

Research activities support nearly 29,000 PhDs, scientific and engineering professionals, support staff, and graduate/undergraduate students at more than 300 universities and at all 17 DOE laboratories

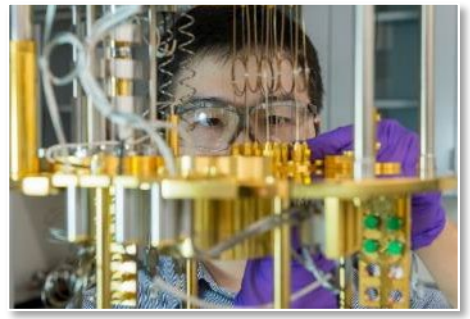
Accelerating discovery with cutting-edge research tools

- Operate 28 scientific user facilities for nearly 34,000 users per year
  - High-performance computing
  - X-ray and neutron sources
  - Physics facilities
  - Nanoscience centers
  - Biocharacterization facilities
- Design and construction of next-generation facilities to support the scientific community

Funding for Accelerated, Inclusive Research (FAIR)

FAIR will enhance research on clean energy, climate, and additional topics spanning the Office of Science portfolio at institutions historically underrepresented in science.

- Build research capacity, infrastructure, and expertise
- Develop mutually beneficial relationships between applicants and DOE national laboratories, user facilities, or R1 MSIs
- Complement the RENEW initiative (traineeships for workforce development)
- Support single institution and a research partner; equipment or infrastructure investments are allowable costs
- Majority of funds will go directly to the lead institution, a portion will fund the partnering institution



Scope

- FAIR invites applications in all areas supported by the Office of Science:
  - Advanced Scientific Computing Research (ASCR)
  - Basic Energy Sciences (BES)
  - Biological and Environmental Research (BER)
  - Fusion Energy Sciences (FES)
  - High Energy Physics (HEP)
  - Nuclear Physics (NP)
  - Isotope R&D and Production (DOE IP)
  - Accelerator R&D and Production (ARDAP)

Eligibility/Teaming Requirements

- All applications must be submitted on behalf of a lead institution and include a single partnering team member as a subrecipient.
- The lead institution must be a non-R1 minority-serving institution (MSI) or an emerging research institution.
- The lead institution should show clear scientific leadership.
- The lead institution must partner with a team member in one of the following categories:
  - a DOE National Laboratory
  - an SC Scientific User Facility
  - an R1 MSI
- The partner is limited to between 15 and 25% of the total funding.

Resources

- Points of contact for all 17 DOE national laboratories and all 28 Office of Science User Facilities are posted at https://science.osti.gov/-/media/Initiatives/pdf/FAIR_Partner_POCs.pdf.
- Institution designations/classifications are posted at https://science.osti.gov/grants/Applicant-and-Awardee-Resources/Institution-Designations.
- For questions about budgets, eligibility, or similar topics, please contact sc.fair@science.doe.gov.
- Questions regarding the specific program areas/technical requirements can be directed to the technical contacts listed within the FOA.

Limitations

- Applicant institutions are limited to no more than one pre-application and one application for each PI at the applicant institution.
- Applicant institutions are also limited to three pre-applications and three applications for each program (ASCR, BES, BER, FES, HEP, NP, DOE IP, and ARDAP) listed in Section I.
- PIs must be in a permanent position at the applicant institution, whether tenured, tenure-track, or a staff appointment.
- Individuals in term-limited appointments, whether as adjunct, visiting faculty, fellows, or similar appointments, are not eligible to be proposed as a PI.
- Individuals in part-time permanent positions are eligible to be proposed as a PI.
- Individuals in a joint appointment are eligible to be proposed as a PI if work will be performed at the applicant institution.

Awards and Funding Levels

- DOE anticipates that a total of $35 million in current fiscal year funds will be used to support awards under this FOA.
- Applications should be between $300,000 and $750,000 total.
- Project periods should be for three years.
- Approximately 47 to 70 awards are expected.

Promoting Inclusive and Equitable Research (PIER) Plan

- Beginning in FY 2023, Office of Science solicitations require applicants to submit a plan for **Promoting Inclusive and Equitable Research (PIER) Plan**, along with their research proposals.
  - This is a requirement for proposals submitted to all Office of Science solicitations, as well as invited proposals from the DOE national laboratories.
- PIER Plans are limited to 3 pages and should describe the activities and strategies that investigators and research personnel will incorporate to promote diversity, equity, inclusion, and accessibility in their research projects.
  - The complexity and detail of a PIER Plan is expected to increase with the size of the research team and the number of personnel to be supported.
  - The PIER Plans will be evaluated under a new merit review criterion as part of the peer review process.
- Additional information and FAQs: https://science.osti.gov/grants/Applicant-and-Awardee-Resources/PIER-Plans

For more information

- The FOA is the authoritative source for this competition:
  - https://science.osti.gov/-/media/grants/pdf/foas/2023/SC_FOA_0002931.pdf
- Frequently Asked Questions (FAQs) are also available with answers to most common questions: https://science.osti.gov/Initiatives/FAIR/Frequently-Asked-Questions
- If you still have questions, you can contact sc.fair@science.doe.gov or the Program Manager listed under each topical area in the FOA for technical questions.

U.S. DEPARTMENT OF
ENERGY

Office of
Science

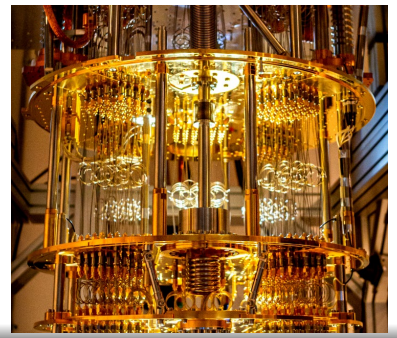
The Office of Science Research Portfolio

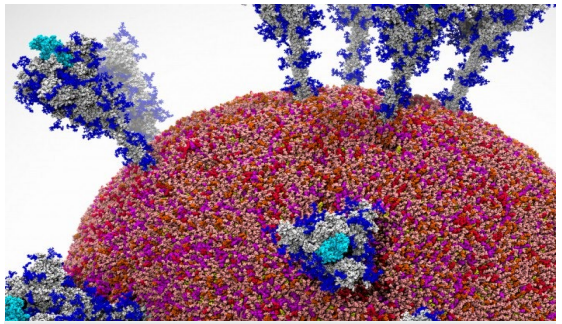
Advanced Scientific Computing Research	• Delivering world leading computational and networking capabilities to extend the frontiers of science and technology
Basic Energy Sciences	• Understanding, predicting, and ultimately controlling matter and energy flow at the electronic, atomic, and molecular levels
Biological and Environmental Research	• Understanding complex biological, earth, and environmental systems
Fusion Energy Sciences	• Supporting the development of a fusion energy source and supporting research in plasma science
High Energy Physics	• Understanding how the universe works at its most fundamental level
Nuclear Physics	• Discovering, exploring, and understanding all forms of nuclear matter
Isotope R&D and Production	• Supporting isotope research, development, production, processing and distribution to meet the needs of the Nation
Accelerator R&D and Production	• Supporting new technologies for use in SC's scientific facilities and in commercial products

Advanced Scientific Computing Research (ASCR)

- ASCR research lays the groundwork for scientific discoveries
  - **Applied Mathematics and Computer Science foundations** to advance the understanding of natural and engineered systems and to reveal scientific insight from high end simulations, models, and data.
  - **Advanced Computing** to prepare for the future of science based on emerging advanced computing technologies and microelectronics.
- ASCR facilities drive American global leadership in computing, data and networking
  - As we deploy the world's first **exascale supercomputers** and the Nation's most **advanced scientific network**, we continue to build a more integrated and open national research infrastructure for all.
- ASCR's investments and strategic partnerships enable scientific breakthroughs and advance America's economic competitiveness
  - ASCR's world-leading programs in **interdisciplinary research** enable scientific applications take full advantage of computing and networking capabilities that push the frontiers.
  - Unique models of partnerships accelerate the competitiveness of **American computing technologies, advanced manufacturing,** and **high-tech companies -** large and small**.**
- ASCR invests in people
  - **Computational Science Graduate Fellowship** – producing computational leaders since 1991.

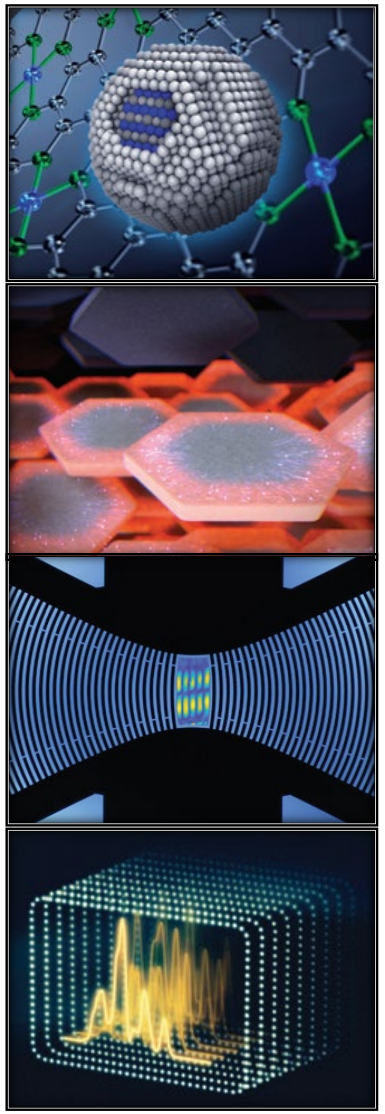
Leadership Computing


Quantum Testbeds


Gordon Bell Prize researchers leverage modeling and AI to understand COVID mutations

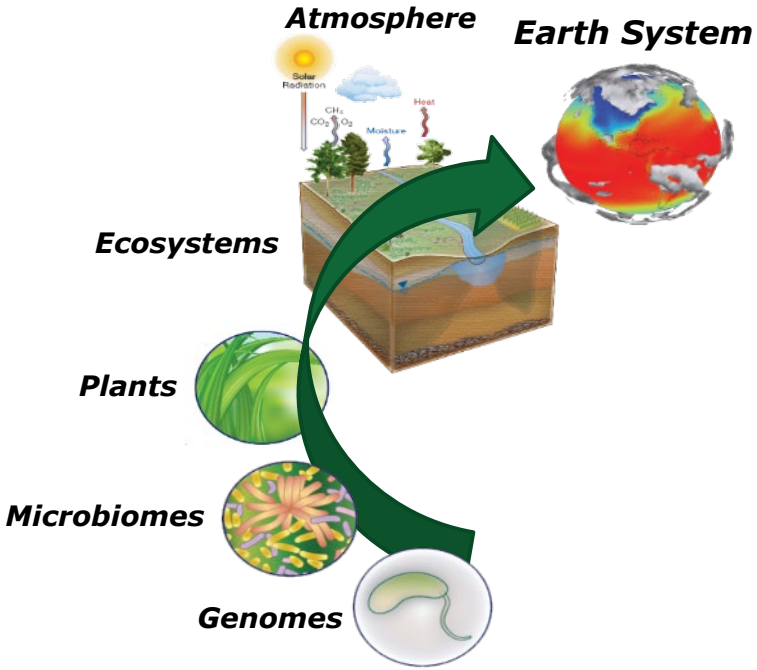
Basic Energy Sciences (BES)

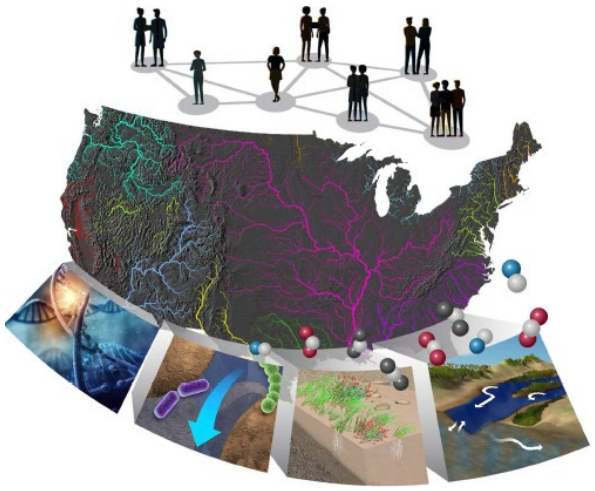
- BES supports discovery science and use-inspired research to solve the challenges facing today's advanced technologies for energy, manufacturing, medicine, and national priorities. BES provides:
  - A **vibrant community of academic and national laboratory researchers** who focus on understanding materials and chemical sciences at the atomic and molecular scales
  - **Cutting-edge scientific facilities** with specialized, state-of-the-art instrumentation such as advanced x-ray light sources, neutron scattering sources, and nanoscale science research centers that are used by **thousands of scientists from many fields**
- BES-supported discoveries drive U.S. leadership in science, sustain innovation across diverse technologies and improve economic and national security.
  - **Foundational scientific understanding** of chemical and materials processes starting at the level of electrons is essential for advancing energy, transportation, chemical, manufacturing, quantum information science, and microelectronics technologies.
  - Continuous progress in basic science is critical to **sustaining U.S. innovation and competitiveness**.
  - Some of the toughest challenges are being tackled by **collaborative teams with diverse skills** at the BES-supported Energy Innovation Hubs and Energy Frontier Research Centers.



Biological and Environmental Research (BER)

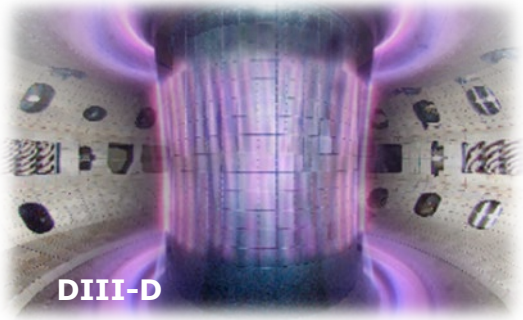
- BER research initiated the human genome project and pioneered research that led to climate and Earth system models.
  - The biology portfolio is using genomics to lay the groundwork for a **thriving bioeconomy** based on sustainable biofuels and bioproducts.
  - The Earth and environment portfolios are adopting AI, machine learning, and exascale-class computing to enhance predictability from local urban scales that include disadvantaged communities, to global scales, for a variety of **energy and environmental issues** of national importance.
- The better we understand how complex Earth and environmental systems work, and can predict their behavior, the more we can harness that knowledge to transform our lives.
  - Through insights gained from genome-enabled research of plants and microbes, BER is advancing the **understanding and design** of new biological systems for sustainable bioenergy and bioproduct production.
  - BER Earth and environmental research explores the science of the atmosphere, oceans, land systems, and cryosphere, how they combine with advanced analytics and DOE's fastest computers to **accurately model the Earth system**.
  - Both efforts are integral to a broad-based effort to **sustain the Earth system** as a habitable environment for humanity into the future.
- To enable these efforts, BER supports three DOE Office of Science user facilities with unique **world-class scientific instruments and capabilities** that are available to the research community.
  - DOE Joint Genome Institute (JGI), Atmospheric Radiation Measurement (ARM) user facility, Environmental Molecular Science Laboratory (EMSL)

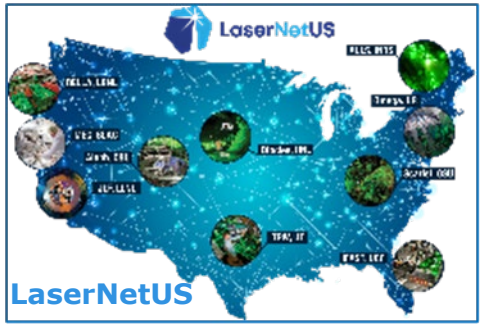




Fusion Energy Sciences (FES)

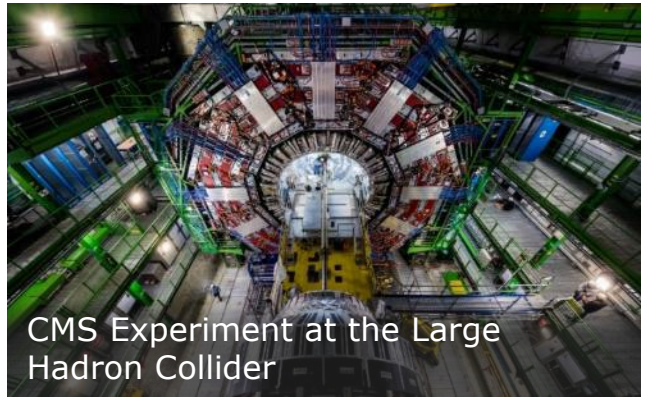
- Fusion research focuses on harnessing the energy released in fusion reactions to develop a carbon-free energy source
  - Once developed, fusion will provide an energy source well-suited for **on-demand electricity production**, supplementing intermittent renewables and fission.
  - Energy from fusion will be **carbon-free**, **inherently safe**, with a **virtually limitless fuel supply**, and **without the production of long-lived radioactive waste**.
- To enable this goal, FES invests in several research programs and partnerships:
  - **Partnerships with the private sector** to accelerate the development and deployment of fusion energy, consistent with the Administration's **Bold Decadal Vision** for commercializing fusion energy
  - Support of two FES SC **Scientific User Facilities** to resolve scientific challenges
  - Research in **fusion theory and simulation** to develop a predictive capability
  - Research in **fusion materials**, **fusion nuclear science**, and **enabling technologies to** address the performance, safety, and environmental attractiveness objectives of fusion energy
  - **International partnerships to** enable U.S. scientists to conduct research on overseas facilities with unique capabilities; The U.S. participation in **ITER**, a large-scale multi-national experiment being built in France, will enable the study of burning plasma science and technology at reactor scale
- The FES program also supports **discovery plasma science** in areas such as plasma astrophysics, high-energy-density laboratory plasmas (HEDLP), and low-temperature plasmas.
  - Discoveries in plasma science are leading to an ever-increasing array of practical applications, including fabrication of microelectronics.

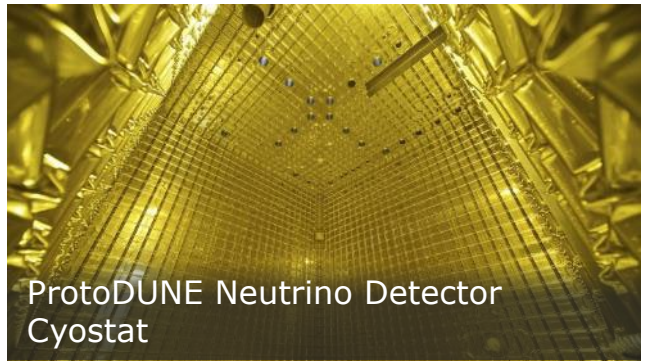




High Energy Physics (HEP)

- Particle physics explores what the world is made of and how it works at the smallest and largest scales.
  - It seeks new discoveries from the **tiniest particles** to the **outer reaches of space**: What is the Universe made of? What forces govern it? How did it become the way it is today?
  - Finding these answers requires the combined efforts some of the largest international **scientific collaborations** in the world, using some of the most sensitive detectors in the world, at some of the largest scientific machines in the world.
- The quest to understand our world inspires young minds, trains an expert workforce, and drives innovation that improves the nation's health, wealth, and security.
  - Particle physicists develop **new tools and technology** that in turn improve medical diagnosis, medicine development, national security, big data computing, and industrial manufacturing.
  - Advancing **microelectronics, accelerators, and detectors** together with **Quantum Information Science** provides opportunities for new insights and approaches.
- Five compelling, intertwined lines of inquiry show great promise for discovery over the next decade.
  - The **Higgs boson**, discovered in 2012, is a new tool for discovery.
  - The puzzling physics of ghostly, very low-mass **neutrinos** is being probed.
  - Experiments seek to identify the physics of **dark matter**.
  - Observations of the Universe aim to reveal the causes of **cosmic acceleration**, such as dark energy and inflation.
  - Experiments also **explore the unknown** for new particles, interactions, and physical principles.

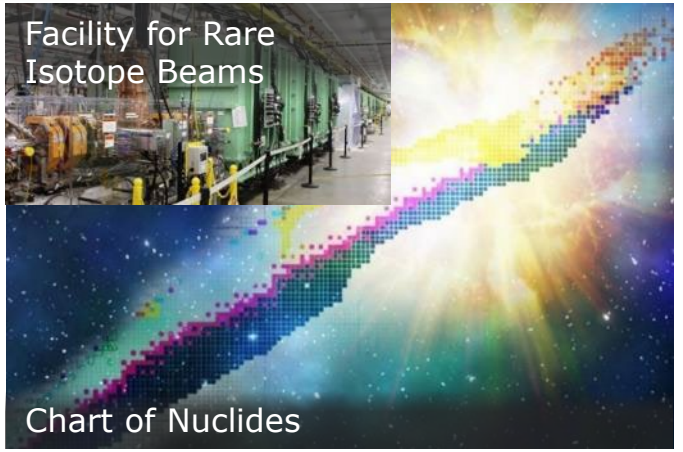

CMS Experiment at the Large Hadron Collider


ProtoDUNE Neutrino Detector Cyostat


DESI Experiment at Kitt Peak

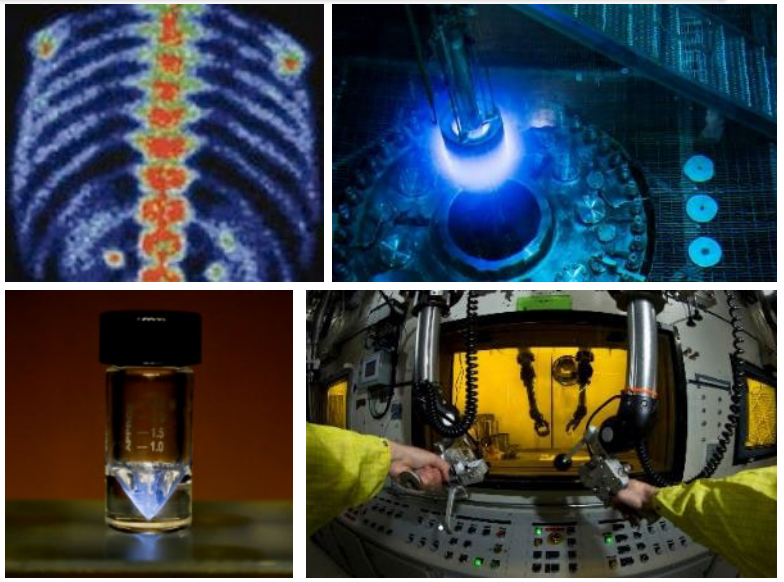
Nuclear Physics (NP)

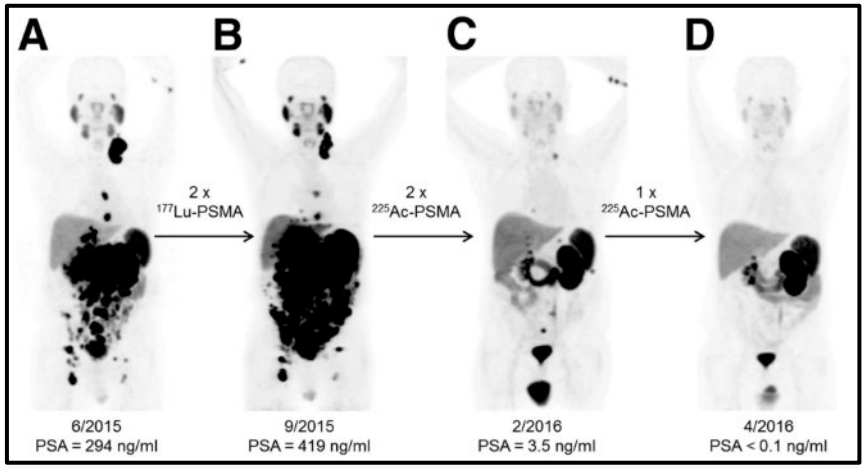
- Nuclear physics seeks to discover, explore, and understand all forms of nuclear matter.
  - The aim is to understand why matter takes on the specific forms observed in nature: How did **visible matter come into being** and how does it evolve? How does **subatomic matter organize** itself and what phenomena emerge? Are the fundamental interactions basic to the **structure of matter** fully understood?
  - To accomplish its mission, NP stewards operations at multiple national **accelerator user facilities**.
- The quest to understand all forms of nuclear matter inspires brilliant scientific minds and benefits society in the areas of energy, commerce, medicine, and national security.
  - Students trained in Nuclear Physics are in **high demand.**
  - They **bring expertise** in nuclear science, accelerator physics, real-time signal processing, high-performance computing, cryogenics, quantum simulators, quantum sensors, AI/ML, lasers, atomic traps, nuclear technology, and particle detection technologies.
- To maintain U.S. leadership, NP builds advanced instrumentation and new tools such as the Facility for Rare Isotope Beams (FRIB) and the future Electron-Ion Collider (EIC).
  - FRIB will uniquely afford access to eighty percent of all isotopes predicted to possibly exist in nature, including over 1,000 **never produced on Earth**.
  - The EIC will provide unprecedented ability discover how the **mass of everyday objects** is dynamically generated by the interaction of quarks and gluons inside protons and neutrons.



Isotope R&D and Production (DOE IP)

- **Isotopes** have unique properties that make them useful in medicine, nuclear batteries, clean energy, basic research, and national security.
  - Isotopes of an element have the same number of protons, electrons, and same chemical properties but **differ in the number of neutrons**.
  - Stable and very long-lived unstable isotopes exist in nature and can be **enriched**, or extracted and purified based on their mass. **Short-lived unstable (or radioactive) isotopes are created** in nuclear reactors and particle accelerators.
- DOE IP researches and develops **new isotope production techniques** of critical radioactive and stable isotopes for the nation.
  - Radioactive and stable isotopes are required for **advancement in basic research** (including QIS), **medical applications** (diagnostic imaging, cancer therapies, infectious diseases), **commercial applications** (energy exploration), **national security** (threat detection, nuclear forensics), **space exploration** (long lived power sources), and other applications.
  - As the only Mission Essential Function within the Office of Science, part of DOE IP's mission is to ensure robust domestic isotope supply chains to reduce U.S. dependency on foreign supply to maintain national preparedness.
- Leveraging the reactor, accelerator, enrichment and isotope processing expertise at the DOE national labs and universities, IP scientists are delivering isotopes for **medical research** on new **diagnostic and therapeutic applications**.
  - Applications include targeted cancer therapy research using short lived radioisotopes such as actinium-225, copper-67 and astatine-211.





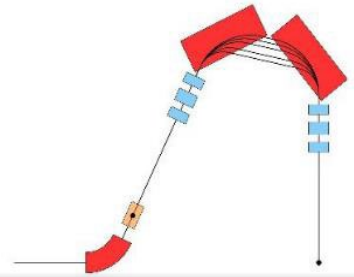
Effective response of a prostate cancer patient to ^{225}Ac-PSMA-617 treatment

Accelerator R&D and Production (ARDAP)

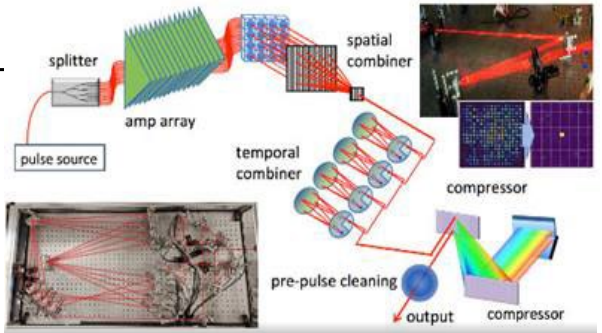
Supporting research and development topics in fundamental accelerator science and technology applicable to a broad spectrum of accelerator types:

- Superconducting accelerator systems—both radiofrequency accelerators and high-field magnets—including research on superconducting materials, engineering, and cryogenic techniques.
- Particle beam physics and high-fidelity computer modeling, including theory and simulation to accurately model the next generation of particle accelerators; faster, higher-resolution charged-particle and x-ray beam diagnostics, more sophisticated and automated control systems, including AI/ML; and advances in particle-collider-specific beam physics including final focusing and advanced cooling techniques.
- Very-high-brightness and high-current electron sources, high-intensity proton and ion sources, and more robust megawatt-class targets for secondary beam production.
- High-average-power radiofrequency and ultrafast laser sources, including improvements in power-handling devices such as waveguide windows and couplers for radiofrequency systems, and high-power optics and coatings for laser systems.
- High-risk high-reward advances in accelerator science and technology, including novel particle sources, advanced beam dynamics, new acceleration techniques, and next-generation materials.

Accelerator Test Facility II (ATF-II)



Superconducting gantry for proton therapy



High-Efficiency High Power Ultrafast Lasers