



View from the NSF: Detector R&D through the NSF Physics Division

J. Cottam-Allen, S. Gonzalez, R. Ruchti, J. Shank, J. Whitmore
NSF/PHY

CPAD2016 Meeting
Caltech, 8-10 October, 2016



NSF Physics Funding Opportunities

The NSF is a science-driven rather than mission-driven funding agency.

Support can come from Particle Physics specific funding opportunities, Physics Division opportunities or cross-cutting opportunities within NSF.

1. Physics Division Solicitation
2. Major Research Instrumentation Program (MRI)



1. Physics Division Solicitation

At the NSF, particle physics is supported by four programs within the Division of Physics:

See the full solicitation *nsf16-566*

<https://www.nsf.gov/pubs/2016/nsf16566/nsf16566.htm>

(1) **Theory program**, which includes fundamental research on the forces of nature and the early history of the universe as well as support for the experimental program by providing guidance and analysis for high energy experiments;

(2) **Elementary Particle Physics (EPP) program**, which supports particle physics at accelerators and advances in detector development;

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5624

(3) **Particle Astrophysics (PA) Program**, which supports non-accelerator experiments;

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5633

(4) **Accelerator Science program**, which supports research at universities into the educational and discovery potential of basic accelerator physics.

- **There are two Merit Review Criteria: Intellectual Merit *and* Broader Impacts.**
- **Training of the next generation workforce is a high priority.**



Experimental Particle Physics Program

- Accelerator-based Particle Physics
 - Colliding Beam Experiments
 - Energy Frontier
 - Lepton Colliders and others
 - Fixed Target Experiments
 - Intensity Frontier
 - Neutrino Experiments

Particle Astrophysics Program



- **Cosmic Phenomena:**

This area supports university research that uses astrophysical sources and particle physics techniques to study fundamental physics.

- Cosmic-rays, gamma-rays, and neutrinos

- Cosmic Microwave Background (CMB)

- Dark Energy

- **Underground Physics:**

This area supports university research that generally locates experiments in low background environments.

- IceCube science program

- Solar, underground and reactor neutrinos

- Neutrino mass measurements;

- Searches for the direct detection of Dark Matter.



PHY division proposal preparation

- All proposals, both science and R&D, now go through a solicitation (*nsf16-566*).
<https://www.nsf.gov/pubs/2016/nsf16566/nsf16566.htm>
Same one for all of Physics.
- There are program specific deadlines (not target dates)
 - EPP and PA – October 26, 2016
 - Theory – December 1, 2016
 - Accelerator Science – February 1, 2017
- All NSF proposals are supposed to conform to the NSF Proposal & Award Policies & Procedures Guide: PPAPG (*nsf16-001*):
<https://www.nsf.gov/pubs/policydocs/pappguide/nsf16001/>
- However the Physics solicitation has some **additional** requirements to aid in the merit review, so proposers need to look closely at both documents.



2. Major Research Instrumentation (MRI)

- Increase access to shared scientific and engineering instruments for research and research training
 - In institutions of higher education, and not-for-profit museums, science centers and scientific/engineering research organizations.
- Improve the quality and expand the scope of research and research training in science and engineering
 - By supporting proposals for shared instrumentation that fosters the integration of research and education in research-intensive learning environments.
- Two types.
 - Track (1) acquisition of a research instrument
 - Track (2) development of a research instrument.
- Proposals for \$100,000 - \$4 million may be accepted from any MRI-eligible organization.
- Proposals for less than \$100,000 may be accepted from non-PhD granting institutions of higher education.



2. Major Research Instrumentation (MRI)

- Present Solicitation *nsf15-504*
- Website: <http://www.nsf.gov/od/oia/programs/mri>
 - Deadline: **January 11, 2017**
 - Program Contact: Kathleen McCloud or EPP/PA program directors





6. Other Programmatic Support...

- Mid-Scale Program
 - See relevant sections of *nsf16-566*
 - <https://www.nsf.gov/pubs/2016/nsf16566/nsf16566.htm>
 - Targeted toward instrumentation acquisition or development at the level of \$4M or above.
 - Directed R&D
 - Applications go through the base programs
 - **Important to discuss any potential submission with EPP/PA program directors first.**
 - Several potential programmatic steps/stages may be necessary...
 - A planning grant may be needed
 - Conceptual Design, Preliminary Design, Final Design

NSF Ideas for Future Investment (Big Ideas)



- Research Ideas:
 - Harnessing Data for 21st Century Science and Engineering
 - Shaping the New Human – Technology Frontier
 - Understanding the Rules of Life: Predicting Phenotype
 - The Quantum Leap: Leading the Next Quantum Revolution
 - Navigating the New Arctic
 - Windows on the Universe: The Era of Multi-Messenger Astrophysics
- Process Ideas:
 - Growing Convergent Research at NSF
 - NSF-Includes: Enhancing Science and Engineering through Diversity
 - Mid-scale Research Infrastructure
 - NSF 2050
 - https://www.nsf.gov/about/congress/reports/nsf_big_ideas.pdf

Final Comments



- Advanced instrumentation research & development ... and fundamental physics discoveries ... go hand in hand.
- NSF EPP and PA programs have a direct interest in strengthening this synergy.
- We look forward to an exciting CPAD2016 meeting.

Information on other programs...



- FY17 Deadlines are past already for these programs, but important to keep them in mind for the future, if applicable.
 - CAREER
 - PIRE



3. CAREER Program

- Current FY17 Deadline is Past...
 - July 22, 2016 for MPS Directorate
- Solicitation: *nsf15-555*
- <http://www.nsf.gov/career/>
- <https://www.nsf.gov/pubs/2015/nsf15555/nsf15555.pdf>



4. PIRE Program

- Current FY17 Deadline Past...
- See Solicitation: *nsf16-571*
- <https://www.nsf.gov/pubs/2016/nsf16571/nsf16571.htm>
 - A new program call appears typically every two years.
 - The emphasis of the program varies and may or may not map onto particle physics related research areas or activity.
- Preliminary Proposal Deadline:
 - September 14, 2016
 - A pre-proposal submission is required.
- Full Proposal (by invitation only) Deadline:
 - April 24, 2017