



Physics Frontiers Centers

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Physics Frontiers Centers Program



The Physics Frontiers Centers program is a separate program within the Physics Division with the goal of:

“fostering major breakthroughs at the intellectual frontiers of physics by providing needed resources such as combinations of talents, skills, disciplines, and/or specialized infrastructure, not usually available to individual investigators or small groups, in an environment in which the collective efforts of the larger group can be shown to be seminal to promoting significant progress in the science and the education of students.”



Physics Frontiers Centers Program

Physics Frontiers Centers are open to all sub-fields of physics within the purview of the Division of Physics (PHY):

- accelerator science
- atomic, molecular and optical physics
- plasma physics
- elementary particle physics
- nuclear physics
- particle astrophysics
- gravitational physics
- physics of living systems

Interdisciplinary projects at the interface between these areas and other disciplines are considered, although the bulk of the effort must fall within the PHY purview. Projects that involve scientific scope outside the PHY purview are co-reviewed and possibly co-funded by partnering programs in other divisions.

There are no quotas for the number of centers in each sub-area of physics. We are open to all possible centers in Physics-supported fields.

Physics Frontiers Centers Program



The Physics Division issues a new solicitation every three years: NSF 16-561
All Physics Frontiers Centers awards are made for five years with the option of a one year extension. For continued funding, existing PFCs must re-compete in the open competition on equal footing with newly proposed centers.

- No limits on how many times a funded center can compete
- No expectation that a funded center will be continued

If an existing Center proposal is not successful, phase-out support may be provided at a reduced level for up to two years under the current award. They may seek alternate sources of funding.

We are looking for the best Physics Frontiers Centers!



Review Criteria – Standard NSF Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria.

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

Both criteria are given full consideration during the review and decision-making processes.

Review Criteria – Additional PFC Criteria



The PFC proposal must exhibit **synergy or value-adding** features that justify center- or institute-type support, rather than an equivalent level of support for individual investigators or small groups. Proposals must address these points for each Major Activity of the PFC, and the roles and responsibilities of each investigator must be described.

Review Criteria – Additional PFC Criteria



Separate Major Activity and PI Evaluation:

- Intrinsic Merit of each MA: Reviewers will be asked to evaluate the overall quality of the proposed MAs, and likelihood that the research or organizational efforts will lead to significant fundamental advances, new discoveries, and/or technological developments.
- Expertise of the PI, any co-PIs and each participating senior investigator: Reviewers will be asked to evaluate the merits of each investigator and their importance and commitment to the PFC goals.

The Center as a Whole:

- Synergy and interconnections within the PFC's Major Activities: Benefits of a multi-investigator, center- or institute-level approach; the synergy among the investigators; and the potential for cross fertilization among Major Activities.
- Institutional setting and rationale for the PFC: Relationship to existing and planned institutional programs and capabilities in physics research and education; intellectual breadth of the proposed program; potential for stimulating creative interaction and collaboration. Potential for institutional, national, and international impact.
- Achievements under prior NSF support, where applicable.

Review Criteria – Additional PFC Criteria



The Center as a Whole (Continued):

- Plans and potential to develop and maintain active collaboration with industry and/or other sectors, where applicable; to stimulate and facilitate knowledge transfer among the institutional participants and between the PFC and other institutions; and to strengthen the links between university-based physics research and its broader impacts. Outreach to other institutions and scientists in the field, including international collaboration and cooperation.
- Plans to establish, operate, and maintain shared facilities and infrastructure and to provide appropriate access to participants from the home institution and from other institutions.
- Potential effect on the infrastructure of science and engineering, particularly in fostering a broadly interactive approach to cutting-edge research and education, developing effective educational outreach programs, fostering a climate of interaction and effective knowledge transfer between the university and its partners, effective use of seed funding, and fostering increased participation in research and education on the part of women and members of underrepresented groups.
- Management plan, and budget. Likely effectiveness of the proposed management plan, including mechanisms for selection of topics and internal allocation of resources, plans for self-evaluation, and plans and potential for maintaining a flexible and innovative program. Appropriateness of the requested budget.



Additional Information

- Each group is free to define an effective program:
 - There is no one model for how a center should be structured or managed. There are successful examples of localized and distributed centers.
 - Similarly, the program does not proscribe the form of the outreach and education components of each center.
- There are no quotas for centers in each sub-area of physics. We are open to all possible centers in Physics-supported fields.
- The funds allocated for centers are separate from the funds allocated for programs funding individual PIs and are not exchangeable.

PFC Review Process



The proposal and review procedure for the PFCs involves three steps

- **Preliminary Proposal Review Panel**

The preliminary proposals were reviewed by a panel of experts covering all areas supported by the Physics Division. For each proposal the PFC Preliminary Proposal Review Panel recommended that the group submitting the preliminary proposal either be invited or not invited to submit a full proposal.

- **External Reviews of Full Proposals**

The full proposals were sent out for individual expert written reviews. These reviews covered all scientific aspects of each proposal. Based on the written reviews the Program Directors in the Physics Division and any interested co-funding partners met and recommended groups either be invited or not invited to the reverse site visit.



Program History

2001 Competition

CENTER FOR GRAVITATIONAL WAVE PHYSICS

Center for Gravitational Wave Physics (CGWP)
Pennsylvania State University



Frontiers in Optical Coherence and Ultrafast Science (FOCUS)
University of Michigan – Ann Arbor



Kavli Institute for Cosmological Physics (KICP)
University of Chicago



Center for the Study of the Origin and Structure of Matter (COSM)
Hampton University



Center for Theoretical Biological Physics (CTBP)
UC San Diego -> Rice University



Center for Magnetic Self Organization (CMSO)
University of Wisconsin - Madison



JINA-CEE

Joint Institute for Nuclear Astrophysics (JINA)
Notre Dame University -> Michigan State University

2002 Competition



Still have questions? Ask early, ask often!

All NSF personnel are listed online. If uncertain about whom to contact, **Deputy Division Directors (below)** may be able to recommend appropriate individuals in their Divisions.

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