

# Management and Operation of the IceCube Neutrino Observatory (ICNO)

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## PROGRAM SOLICITATION

NSF 15-587



National Science Foundation

Directorate for Geosciences  
Division of Polar Programs

Directorate for Mathematical & Physical Sciences  
Division of Physics

**Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 07, 2015

## IMPORTANT INFORMATION AND REVISION NOTES

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Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 15-1), which is effective for proposals submitted, or due, on or after December 26, 2014. The PAPPG is consistent with, and, implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200).

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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**Program Title:**

Management and Operation of the IceCube Neutrino Observatory (ICNO)

**Synopsis of Program:**

The IceCube Neutrino Observatory (ICNO) is a national facility that enables a wide array of internationally collaborative scientific research in ground based neutrino astrophysics. The physical infrastructure of the ICNO consists of: (1) a fixed array of sensors deep in the ice beneath the South Pole (the main IceCube detector), (2) a surface array of sensors (IceTop), (3) a data acquisition system and associated computing and communications systems at South Pole Station that facilitate recording sensor data, limited analysis and filtering of data for such things as event detection, and transmitting approximately 110 GB/day of data to a data system in the United States, and (4) a computing system for data management and analysis that is hosted by the awardee institution (currently University of Wisconsin, Madison).

The IceCube Collaboration is an international collaboration of scientists (currently involving over 40 institutions from more than 10 countries) who conduct scientific analysis of data collected by ICNO. In addition to conducting scientific analysis of ICNO data, members of the collaboration contribute to the overall enterprise by performing service work (labor) needed to operate the ICNO or prepare data for scientific analysis, and some collaborating institutions provide computing and database infrastructure and services to facilitate the work of the Collaboration. Collaboration members also contribute funds on a per-person basis to the Common Fund which is used to help cover costs of computing equipment and software development required by the Collaboration.

The ICNO Management and Operation (M&O) activity, the subject of this solicitation, constitutes the human interaction and labor needed to keep the ICNO physical infrastructure operational, to manage detector operational parameters that serve the science as defined by the IceCube Collaboration, to conduct data management and data reduction activities as a service to the Collaboration, to coordinate the contributions of in-kind labor or services contributed by members of the Collaboration, and to manage the Common Fund.

The ICNO is located at the U.S. Amundsen-Scott South Pole Station, where it is operated under the auspices of the U.S. Antarctic Program (USAP) (<http://www.usap.gov>). ICNO is sponsored by the National Science Foundation (NSF) and managed by an awardee organization, currently the University of Wisconsin, Madison, under a cooperative agreement with NSF. The awardee organization is responsible for all management and administrative tasks enumerated below, for the operational interface with the USAP and for the organization and conduct of the ICNO operations as defined by the IceCube Collaboration (defined below).

The ICNO's core mission is to facilitate access for researchers to IceCube's state-of-the-art observational capabilities and data. The ICNO data enable the research community to pursue a broad range of modern astrophysical investigations from studying neutrinos generated by cosmic rays in the Earth's atmosphere, to neutrinos coming from the Sun, the Milky Way Galaxy, and extragalactic sources. ICNO data are also used by the Collaboration to study the most violent cosmic events (active galactic nuclei and black holes) in the universe, as well as seeking indirect observations of Dark Matter and Dark Energy.

Proposals are solicited to organize and manage all ICNO administrative and technical activities at the South Pole as well as those activities at the awardee institution or contributed as service work or resources by Collaboration members at U.S. or foreign institutions. International partners in the IceCube Collaboration provide additional funding and personnel support, approximately matching anticipated funds provided by NSF to the U.S.-based ICNO M&O awardee institution. The awardee will work closely with NSF and the IceCube Collaboration to ensure that ICNO continues to facilitate frontier science, supported through separate research proposals, which can be enabled by these unique observations. In cooperation with NSF and within available resources, the ICNO M&O awardee will plan and execute a viable, coherent and inclusive program to facilitate research and education, consistent with the objectives and priorities of the scientific community.

The primary effort is to manage the ICNO M&O workforce of scientists, engineers, technicians and administrators to ensure that ICNO tasks are properly defined and assigned and that the resources needed to perform each task are available when needed. Efforts include monitoring activities so that resources are used efficiently to accomplish the required tasks and to achieve the scientific objectives set forth by the IceCube Collaboration (see governance document and other materials in the Solicitation Resource Library).

Proposals should describe how the proposing organization will provide access to research capabilities and ICNO scientific data; facilitate an integrated program of research, education, training and outreach; maintain instruments, facilities and infrastructure; manage and develop a skilled and diverse workforce; and establish appropriate partnerships with academic institutions, industry, and nonprofit entities.

Within available resources and consistent with the expectations and criteria identified in this solicitation, the successful proposal should present a compelling, sustainable vision for the ICNO that will facilitate integration of research and education activities in the various fields of neutrino physics.

#### **Cognizant Program Officer(s):**

*Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.*

- Vladimir Papitashvili, Program Director, Antarctic Astrophysics & Geospace Sciences, telephone: (703) 292-7425, fax: (703)292-9079, email: [vpapita@nsf.gov](mailto:vpapita@nsf.gov)
- James Whitmore, Program Director, Particle Astrophysics, telephone: (703) 292-8908, fax: (703)292-8908, email: [jwhitmor@nsf.gov](mailto:jwhitmor@nsf.gov)

#### **Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):**

- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences

## **Award Information**

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**Anticipated Type of Award:** Cooperative Agreement

**Estimated Number of Awards:** 1

**Anticipated Funding Amount:** \$35,000,000

(This is the projected total amount of NSF funding for the 5-year duration of the award, starting April 1, 2016, subject to the availability of funding with the possibility for renewal of the award for an additional five years contingent on a successful mid-term performance review.)

## **Eligibility Information**

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#### **Who May Submit Proposals:**

Proposals may only be submitted by the following:

- Proposals may only be submitted by U.S. universities and colleges, and other U.S. non-profit, non-academic organizations operating as an autonomous organization or as an identifiable, separately operating unit of a parent organization. Consortia may include international partnerships, but NSF funds may be awarded only to U.S.-based organizations, and hence NSF expects the U.S. organization to be the lead organization.

#### **Who May Serve as PI:**

There are no restrictions or limits.

**Limit on Number of Proposals per Organization:** 1

**Limit on Number of Proposals per PI or Co-PI:** 1

## **Proposal Preparation and Submission Instructions**

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### **A. Proposal Preparation Instructions**

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF

- website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=ggg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=ggg).
- o Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide))

## B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

## C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 07, 2015

## Proposal Review Information Criteria

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**Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

## Award Administration Information

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**Award Conditions:** Additional award conditions apply. Please see the full text of this solicitation for further information.

**Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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## I. INTRODUCTION

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The National Science Foundation (NSF) is authorized by the National Science Foundation Act of 1950, as amended, to initiate and support basic and applied scientific research and to initiate and support programs to strengthen scientific research potential. To achieve these goals, NSF supports facilities that provide research capabilities in various scientific disciplines. The IceCube Neutrino Observatory (ICNO) is one such facility that supports research in ground-based neutrino astrophysics and serves the U.S. and international astronomy and astrophysics communities.

In order to implement the National Science Board recommendations and to ensure that investments of the Agency's resources are well justified, the next cooperative agreement for ICNO Management and Operations (M&O) is open for recompetition. However, under constrained budget projections, anticipated NSF funding for future management and operation of ICNO is expected to be only slightly above recent levels. Proposing organizations are encouraged to present creative, but realistic plans to deal with the budget

exigencies imposed on the baseline scope.

## II. PROGRAM DESCRIPTION

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### A. Description of the IceCube Neutrino Observatory

#### 1. Overview

ICNO is a major scientific facility sponsored by the NSF and operated by an awardee under a cooperative agreement with NSF. It is a national facility that enables research in ground-based neutrino astrophysics by the U.S. and international astronomy and astrophysics communities. The physical infrastructure of the ICNO consists of: 1) a fixed array of sensors deep in the ice beneath the South Pole (the main IceCube detector), 2) a surface array of sensors (IceTop), 3) a data acquisition system and associated computing and communications systems at South Pole Station that facilitate recording sensor data, limited analysis and filtering of data for such things as event detection, and transmitting approximately 110 Gb/day of data to a data system in the United States, and 4) a computing system for data management and analysis that is hosted by the awardee institution (currently University of Wisconsin, Madison).

The IceCube Collaboration is an international collaboration of scientists (currently involving over 40 institutions from more than 10 countries) who conduct scientific analysis of data collected by ICNO. In addition to conducting scientific analysis of ICNO data, members of the collaboration contribute to the overall enterprise by performing service work (labor) needed to operate the ICNO or prepare data for scientific analysis, and some collaborating institutions provide computing and database infrastructure and services to facilitate the work of the Collaboration. This approach creates a mechanism for collaborating scientists and institutions to help support the work needed to make ICNO data useful scientifically and also serves to provide students and postdocs experience in operations of a major astrophysics facility.

The ICNO Management and Operation (M&O) activity, the subject of this solicitation, constitutes the human interaction and labor needed to keep the ICNO physical infrastructure operational, to manage detector operational parameters that serve the science as defined by the IceCube Collaboration, to conduct data management and data reduction activities as a service to the Collaboration, and to coordinate the contributions of in-kind labor or services contributed by members of the Collaboration. Data management and data reduction work includes activities such as conducting detector calibration assessments, conducting detector simulation modeling as baseline information for understanding events, managing the data flow from sensors to delivery to scientists for analysis, and conducting basic data quality assurance and quality control activities that contribute to making the ICNO data useful for science. In order to coordinate contributions of labor or resources provided by members of the Collaboration, the awardee is expected to maintain Memoranda of Agreement with all IceCube Collaboration parties to ensure that the ICNO M&O activities are fully supported.

As described above, the core mission is to facilitate access by researchers to ICNO's data and computing resources for neutrino astrophysics (see the IceCube Governance Document in the Solicitation Resource Library). The ICNO data enable researchers — to pursue a broad range of modern astrophysical challenges from studying neutrinos generated by cosmic rays in the Earth's atmosphere to those coming from the Sun or Milky Way Galaxy, and to extragalactic neutrinos from the most distant galaxies of the early Universe. ICNO data are also used by the Collaboration to look for the most violent cosmic events (active galactic nuclei and black holes), as well as seeking indirect observations of Dark Matter and Dark Energy. Responders to this solicitation should propose to manage the baseline scope for ICNO as described in Section II.A.3.

ICNO facilities in Antarctica are located at the U.S. Amundsen-Scott South Pole Station, which is managed by NSF as part of the U.S. Antarctic Program (USAP; for further information see: <http://www.usap.gov>). Materials that serve to describe the overall IceCube Collaboration, its governance structure, as well as the ICNO physical infrastructure, the current M&O activities, and the nature of contributions made by Collaboration members are available on a web-based library managed by NSF for this solicitation. Contact a cognizant Program Officer for access to the Solicitation Resource Library ([http://www.nsf.gov/geo/plr/ant/icno\\_library/index.jsp](http://www.nsf.gov/geo/plr/ant/icno_library/index.jsp)).

#### 2. Current ICNO M&O award

The current (FY 2011-2015) M&O award in the amount of \$34,500,000 comes from the Division of Polar Programs (PLR) and the Division of Physics (PHY) within the NSF. The ICNO M&O budget target for funding from NSF for the period FY 2016-2020 is not to exceed \$35,000,000. Currently, the full cost of managing and operating the ICNO is approximately equally split between the NSF in the U.S. and foreign funding agencies that support non-U.S. partners in the IceCube Collaboration. The respective funding agencies for the ICNO international partners will continue to provide significant support, in proportion to their participation and as their contribution to maintaining the ICNO. This will be provided through support of additional M&O personnel or contributions of essential resources and direct funding contributions to the ICNO Common Fund managed by the U.S.-based ICNO M&O awardee (see IceCube Solicitation Resource Library).

#### 3. Baseline Scope for ICNO M&O

This section describes the scope for ICNO M&O that NSF intends to fund through this solicitation and to which responders to this solicitation should propose. The section also provides guidance on the allocation of the budget. In defining the baseline scope, NSF considers the ICNO to be comprised of three major activities:

**ICNO Core Operations:** scientific, technical, administrative integration and coordination, currently conducted at ICNO headquarters (HQ) at the University of Wisconsin at Madison and collaborating U.S. academic institutions.

**Foreign Partners Operations:** ICNO international partners, mainly in Belgium, Germany, and Sweden, but organizations in other collaborating countries are also involved ([http://www.nsf.gov/geo/plr/ant/icno\\_library/index.jsp](http://www.nsf.gov/geo/plr/ant/icno_library/index.jsp)).

**South Pole Operations:** data from the IceCube neutrino detector beneath the U.S. Amundsen-Scott South Pole Station as well as from the IceTop array are routed to the ICNO computer center on station where data are recorded and undergo initial processing prior to transmission, via USAP-provided satellite communications services, of a subset of the data to ICNO HQ at the awardee institution.

NSF/PLR and PHY anticipate providing up to \$7,000,000 total M&O funding in FY 2016 for the U.S. ICNO managing organization. These funds can be distributed amongst any U.S. partners in accordance with the proposed management framework and budget.

### B. Description of Awardee Responsibilities

## 1. Responsibilities

The Awardee shall be responsible for the management, operation, and maintenance of the IceCube Neutrino Observatory (ICNO) in accordance with the proposal submitted in response to this solicitation and according to Annual Program Operating Plans submitted to NSF prior to each year of work. The Awardee shall be responsible for the overall welfare of the ICNO physical infrastructure and for maximizing the benefits to the U.S. and international astrophysics communities.

The Awardee shall be responsible for the planning, initiation, and execution of programs and activities designed to optimally serve the interests of the U.S. and international astrophysics communities involved in ground-based neutrino astronomy. The Awardee will work closely with NSF as well as the astrophysics and broader science communities to ensure that the activities carried out at and by ICNO strongly reflect community needs and priorities. In discharging these responsibilities, the Awardee shall ensure that the character and reputation of ICNO as an international scientific resource are maintained, and that it enables first-rate scientific research

A major aspect of the Awardee's effort is to manage the ICNO workforce of scientists, engineers, technicians and administrators to ensure that ICNO M&O tasks are properly defined and assigned and that the resources needed to perform each task are available when needed. Specifically the awardee is responsible for:

- a. Maintaining the ICNO primary financial accounts and provide annual reports to NSF for:
  - o M&O Core Account to monitor all expenditures and deliverables from the U.S. subawardee institutions (currently seven);
  - o U.S. Common Fund Account to enable U. S. collaborating institutes to contribute to the costs of maintaining computing hardware and software based on bilateral Memoranda of Understanding (MoU) between the ICNO managing organization and collaborating institutions.
- b. Providing resources for the IceCube Collaboration to run analysis jobs on the collected data and simulations.
- c. Organizing various Working Groups needed by the IceCube Collaboration in order to define operating parameters to maintain and control the ICNO systems (see ICNO materials in the NSF Solicitation Library):
  - o Calibration and Environmental Monitoring functions for all in-ice and surface air shower array (IceTop) digital optical modules (DOM);
  - o Data processing, data storage, and long-term raw data archiving;
  - o Satellite bandwidth and data transmission;
  - o Triggers and quasi-real time alerts;
  - o Production of simulations.
- d. Providing a single point of contact to serve as the interface between the ICNO scientific and technical activities and the NSF Science Support Manager for the USAP.
- e. Maintaining a data release policy consistent with the NSF Open Access of Data Sharing requirements.
- f. Facilitating and coordinating the education and public outreach activities.

### Foreign Partners Operations:

Maintaining the financial accounting and providing annual reports to NSF and foreign funding partners for:

- Non-U.S. Common Fund Account (based on bilateral MoUs) to enable international partners to contribute to the costs of maintaining computing hardware and software for the ICNO operation that are located at the awardee organization's site and South Pole Station; the equipment and software will convey to a new awardee.

### South Pole Operations: (see the NSF Solicitation Resource Library for detailed information)

- a. Maintaining and monitoring the performance of the ICNO cubic-kilometer neutrino detector and the IceTop array at South Pole, including tracking the detector's up- and down-times.
- b. Maintaining, monitoring, and upgrading/developing when necessary, the ICNO Data Acquisition (DAQ) and Supernova Alert systems; monitoring the data processing and quality control, and selecting and reconstructing events for transmission to the U.S.-based managing organization using geostationary-satellite links maintained by the USAP.
- c. Maintaining and monitoring the performance of the ICNO System Servers that provide computing power and storage at both the South Pole and at the ICNO M&O awardee institution in the U.S.
- d. Employing and training IceCube "Winterover" personnel for the austral winter (February to November) period.
- e. Maintaining and monitoring the ICNO communications systems at South Pole.
- f. Providing engineering and technical support for enabling the development (in the U.S. or foreign partner institutions) of new detector functionalities.

## 2. Quality Objectives

In performing the ICNO M&O mission, the Awardee will be required to demonstrate continuing progress in the following areas:

- Implementation of effective programmatic and budgetary planning processes;
- Implementation of efforts to control costs;
- Implementation of an effective workforce management plan, including continuing improvement in the representation of women and underrepresented groups; and
- Development and use of effective measures for assessing the performance of the ICNO physical facilities and metrics for assessing the performance of the managing organization.

## 3. NSF Expectations for Awardee Performance

NSF intends that ICNO should serve as an exemplar of scientific facility management and operational excellence. The Awardee will meet the highest standards for service and delivery to the scientific community and demonstrate a proactive and effective approach to performance management. The Awardee will promote a culture of excellence in serving the scientific community. Working in close collaboration with NSF, the university and broader scientific communities, the Awardee is expected to:

- operate with integrity and transparency, maintaining quality in administration and management in a cost-effect manner;
- develop and implement appropriate mechanisms for assessing and continuously improving the performance of ICNO;
- develop and use appropriate means for self-assessment of ICNO management effectiveness in order to inform a continuous improvement process;
- develop and use effective programmatic and budgetary planning processes;
- manage the operation and maintenance of observational facilities, computational infrastructure, and databases, so they are accessible to the community in accordance with needs of the IceCube Collaboration and the NSF data access policy;

- operate and maintain the ICNO facilities and manage the ICNO staff and all activities carried out at ICNO according to current best-practice and in full compliance with all relevant laws and regulations;
- serve as the employer of record of ICNO base operations staff, including winterovers at South Pole, and maintain appropriate personnel policies that adhere to the labor laws of the State in which the employees are employed;
- develop and maintain a high quality, diverse scientific, engineering, technical, and administrative staff to operate ICNO as a national and international center and to enhance the community, within the defined programmatic scope;
- strengthen ICNO's role in increasing participation by under-represented groups in the staffing at ICNO and in the future workforce;
- serve as stewards of high-quality scientific data on behalf of the community, through maintenance, enhancement and curation;
- develop and employ effective mechanisms for engaging ICNO's stakeholders in order to ensure that ICNO's facilities, services and programs best reflect the evolving needs and priorities of its users;
- develop and incorporate new capabilities and on-line services as needed by the U.S. ground-based astrophysics community, within available resources, to ensure IceCube community access to the state-of-the art facility and data;
- enable, in concert with the IceCube Collaboration, an education and public outreach program; and
- actively support cultivating a world-class, broadly inclusive science and engineering workforce and expanding the scientific literacy of all citizens.

#### 4. Important Considerations in Preparation of a Proposal

Business functions must meet the requirements set forth in 2 CFR §200, the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (for more details see Section V.B below).

Proposers are expected to have mature business systems that will support successful administration of this award, including:

- an organizational structure with well defined lines of authority and responsibility within the organization;
- provisions for business and human resources services;
- staffing policies and the staffing required to operate the organization within the funding provided;
- a workforce management plan;
- procedures for budgeting within the organization;
- a procurement office or offices with trained staff and acquisition planning experience;
- an accounting system with the procedures for auditing and oversight, and the ability to segregate and account separately for funding from NSF and that from the international partner;
- a property system that is capable of acquiring, tracking and controlling equipment funded by NSF and, separately, equipment funded by the international partnership; and
- a process for planning future operations and initiatives that includes science community input.

Proposers should consider the following areas of awardee responsibility:

**a. Management.** The Awardee will define and implement an organizational structure for ICNO that will provide vision, leadership and service to manage ICNO as a vibrant, community-serving, multi-user facility that is an effective national and international resource. Models and approaches for observatory management should be consistent with the goals of serving the needs of the scientific community and meeting the requirements described in this solicitation. Organizational structures for ICNO management may include the establishment of new institutions, corporations or consortia, provided that the proposing organization(s) provide materials in support of the financial capability of the awardee(s), as required in Section V.B.

The Awardee will establish and maintain an effective governance and advisory structure to provide guidance, advice and oversight for all ICNO activities, consistent with its vision, goals, and objectives. The Awardee's advisory structure should enable diverse representation from all sectors served by ICNO, and should include mechanisms to assess and advise on all aspects of ICNO including management, research, education and outreach, technical capabilities, project management, and human resources. Membership of the awardee's external advisory committee is subject to NSF approval.

With the NSF's approval, the Awardee will establish processes within a structured framework for planning, review and performance management, including the development and use of appropriate mechanisms to aid both the managing organization and ICNO's stakeholders in assessing performance and identifying areas for improvement.

**b. Operations, maintenance, environmental compliance, safety, health, and security.** The Awardee will be responsible for staffing and managing ICNO to ensure that community service functions, and ICNO detectors and data collection facilities are able to operate in response to high-priority scientific research conducted by the IceCube Collaboration.

The Awardee will provide a data management plan [see the NSF Grant Proposal Guide, section II.C.2.] that describes the acquisition, analysis, archiving and accessibility of all ICNO data, including the definition of proprietary periods and appropriate cyberinfrastructure and cybersecurity requirements.

All parts of the ICNO infrastructure that are necessary to meet the proposed operations activities will be competently maintained to enable the attainment of program objectives and for the safety and security of staff (and visitors at non-Antarctic locations). The Awardee will be responsible for budgeting, scheduling and tracking a comprehensive safety, environmental compliance, and maintenance plan for all parts of the ICNO infrastructure, including plans, as appropriate, to remove or dispose of those parts of the infrastructure deemed unnecessary for the proposed level of operations, as described in [NSF 15-529 Antarctic Research Program Solicitation \(VI.A.2 Additional Solicitation Specific Review Criteria \[http://www.nsf.gov/publications/pub\\\_summ.jsp?ods\\\_key=nsf15529\]\(http://www.nsf.gov/publications/pub\_summ.jsp?ods\_key=nsf15529\)\)](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf15529).

**c. Budgeting, staffing, and workforce management.** The Awardee will demonstrate competence in managing the budget and operations of an organization such as ICNO.

ICNO offers significant potential to enable the participation of traditionally underrepresented and underserved communities in the research and education mission of the Observatory and to strengthen the strategic growth of a scientific and technically trained workforce in the States in which it operates. The Awardee will demonstrate leadership in employing best practices for broadening participation in science and engineering at all levels within ICNO's activities.

**d. Science and facility planning.** The Awardee will define a Long-Range Plan (typically 5-yr) and an annual Program Operating Plan for ICNO that demonstrates responsiveness to community-based scientific objectives, an innovative vision built on existing and potential capabilities of ICNO, a well-defined scope of high-priority activities, and a credible plan within available resources to support the proposed suite of activities.

As described by the proposed program and within available funds, the Awardee will ensure that ICNO has sufficient internal or external expertise to (1) support community users, (2) help guide decisions relating to current and future instrumentation and

operating modes, (3) develop and maintain data acquisition, data management, and data processing systems, (4) develop and implement policies and strategies for data accessibility and data archiving, and (5) validate data of on-going research programs.

**e. Education and Public Outreach.** The IceCube Collaboration currently operates a vigorous program of education and community development activities that include collaborative partnerships with undergraduate and minority-serving institutions, student involvement in research, and a significant base of public outreach. The Awardee will be responsible for facilitating the education and outreach activities of the Collaboration within the constraints of available resources.

As appropriate, the Awardee may develop partnerships, collaborations, or arrangements with universities/colleges, national laboratories, research museums, private sector research laboratories and observatories, state and local government laboratories, and international collaborations that would enable ICNO and the IceCube Collaboration to attain or exceed its strategic goals.

### **C. General Information**

For additional information on ICNO, the competition for its management, and NSF practices and policies, proposing organizations should review the documents that are being made available through an NSF-maintained Solicitation Resource Library. The documents are grouped in categories that include:

- IceCube Governance Document;
- Existing Cooperative Agreement and latest Annual Report;
- IceCube Data Sharing Policy;
- Master Site Infrastructure Plan and Description;
- Inventories of NSF and non-NSF owned equipment;
- Memoranda of Understanding and Similar Agreements;
- Summary of IceCube Antarctic Operations;
- NSF Antarctic Research Solicitation; and
- Frequently Asked Questions (FAQ).

Password-protected access to the Solicitation Resource Library will be provided to proposing organizations upon request to the Cognizant Program Officers. Any added and updated material and information relating to this solicitation, including NSF responses to frequently asked questions, will be made available through the [Solicitation Resource Library](#) as appropriate.

## **III. AWARD INFORMATION**

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Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

The successful proposal will be awarded as a Cooperative Agreement with expected five-year duration with the possibility for renewal of the award for an additional five years contingent on a successful mid-term performance review (see Section VII.B "Special Award Conditions").

NSF funding for ICNO baseline management and operation is anticipated at the level of up to \$7,000,000 per year for the duration of the award. These budget amounts are for planning purposes only. Actual annual funding increments will be determined on the basis of annual program operating plans submitted by the Awardee to NSF and approved by NSF, subject to the availability of appropriated funds and contingent upon successful performance of both the Awardee and ICNO.

If a new awardee is selected to replace the incumbent, NSF will negotiate unavoidable costs associated strictly with the transition itself but not including costs that would be part of the regular management responsibility. During this transition period, the new awardee will have appropriate access to the current ICNO facilities.

## **IV. ELIGIBILITY INFORMATION**

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### **Who May Submit Proposals:**

Proposals may only be submitted by the following:

- Proposals may only be submitted by U.S. universities and colleges, and other U.S. non-profit, non-academic organizations operating as an autonomous organization or as an identifiable, separately operating unit of a parent organization. Consortia may include international partnerships, but NSF funds may be awarded only to U.S.-based organizations, and hence NSF expects the U.S. organization to be the lead organization.

### **Who May Serve as PI:**

There are no restrictions or limits.

**Limit on Number of Proposals per Organization: 1**

**Limit on Number of Proposals per PI or Co-PI: 1**

### **Additional Eligibility Info:**

Collaborative proposals as separate (parallel) submissions will not be accepted. Proposers can enter into sub-recipient arrangements (contracts or subawards) to enable needed collaborative relationships. The main proposing organization will be held responsible for full compliance with the scope of work mentioned in their proposals and the terms and conditions of any resulting cooperative agreement.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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**Full Proposal Preparation Instructions:** Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov). Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

See Chapter II.C.2 of the GPG for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions.

The Full Proposal shall conform to the guidelines specified in the NSF Grant Proposal Guide or the NSF Grants.gov Application Guide, except where detailed below.

Proposers are reminded to review procedures under "Proprietary or Privileged Information" in Chapter 1, Section D.3 of the GPG and to mark only such information, including patentable ideas, trade secrets, privileged or confidential commercial or financial information, disclosure of which might harm the proposer, with the appropriate legend such as, "The following is (proprietary or confidential) information that (name of proposing organization) requests not be released to persons outside the Government, except for purposes of review and evaluation."

Please also see the section entitled "Privacy Act and Public Burden Statements" below. The following information is required for the Full Proposal:

1. PI/Co-I Information: This should follow the standard GPG or NSF Grants.gov Application Guide guidelines.
2. Cover Sheet: A cover sheet must be submitted and electronically signed by an Authorized Organizational Representative for all full proposals.
3. Project Summary: This section should provide a one-page summary of the key points of the proposal and should be understandable to a scientifically or technically literate lay reader. This section must follow the standard GPG or NSF Grants.gov Application Guide guidelines. Proposals that do not include an overview and separate statements on intellectual merit and broader impacts within the one-page Project Summary will not be accepted by FastLane or will be returned without review.
4. Project Description: Each proposal should describe the proposing organization's scientific, technical, and managerial qualifications to operate ICNO by addressing the areas described in Section II.B.4, Important Considerations in Preparation of a Proposal, items a. through e. of this solicitation. The Project Description section should be structured to map to items a. through e. in Section II.B.4. The Project Description is limited to no more than **30 pages**. Where noted below, necessary resource material may be marked separately as an Appendix to the proposal and submitted as Supplementary Documentation (see below). Such material is not subject to, or included in, the 30-page limit.
5. References Cited: This section should follow the standard GPG or NSF Grants.gov Application Guide guidelines.
6. Transition Plan: Proposing organizations, other than the incumbent, may be funded for an additional transition period of four months preceding the transfer of operating authority. If a new awardee is selected to operate ICNO, the incumbent will cooperate with the successor to the extent necessary to facilitate uninterrupted support for ICNO during the transition period and will provide transfer of legal rights to relevant property and equipment. NSF will support appropriate transition costs incurred by a successor awardee if different from the current awardee.

Organizations other than the incumbent should provide, as a Supplementary Document not to exceed 10 pages, a detailed transition plan and budget for a transition period of up to four months preceding the new award.

The transition plan must include, at a minimum:

- A proposed duration and schedule for the transition period;
  - Estimated resource needs for the transition period;
  - Plans for recruitment, orientation and training;
  - Plans for changes to staffing, facilities or operational modes;
  - A plan to acquire office infrastructure and manage the transfer of assets, inventory, commitments, plans and documents;
  - Identification of assumptions that underlie the transition plan;
7. Other Supporting Materials: Within the 30-page limit, the proposing organization may provide additional material that it believes will be of assistance in evaluating the proposal but that does not fit into any of the defined sections above.



8. Biographical Sketches: A resume, limited to 2 pages, should be provided for the PI, each co-PI, and all Key Personnel as required in GPG Section II.C.2.f.(i)a-d. Other GPG guidelines on order and format do not apply to this section of the proposal.
9. Budget: See the instructions in Section B, below.
10. Current and Pending Support: This section should follow the standard GPG or NSF Grants.gov Application Guide guidelines.
11. Supplementary Documentation: As specified in this solicitation (e.g., the required Transition Plan) and in the NSF Grant Proposal Guide. Examples include, but are not limited to, documentation of collaborative arrangements of significance to the proposal through letters of collaboration, and the required submission of a Postdoctoral Researcher Mentoring Plan (if any included) and the Data Management Plan as required by GPG.
12. Single Copy Documents: Information for the two items below should be entered via the Single Copy Documents section in FastLane as "Additional Single Copy Documents." This information is required by NSF for determining conflicts of interest in the review process. The information includes the names of Project Personnel and the names of Collaborators and other Individuals with Conflicts. The information should be entered in the Single Copy Document section of FastLane "List of Personnel, Collaborators and Affiliates."

Project Personnel: Provide the full names and affiliations of all Key Personnel.

Collaborators/Individuals with Conflicts of Interest: Provide the names of all persons, participants and affiliates with potential conflicts of interest as specified in Section II.C.2.f.(i)e. of the NSF GPG 13. The following section is not required for the Proposal:

Facilities, Equipment and Other Resources (all relevant information must be provided in the Project Description and Appendices).

Proposers should insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept the proposal for further consideration.

## B. Budgetary Information

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**Cost Sharing:** Inclusion of voluntary committed cost sharing is prohibited

**Other Budgetary Limitations:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

**Budget Preparation Instructions:**

The full proposal should include a budget on the budget form in FastLane or the R&R Budget Form in Grants.gov for the five-year period proposed. The first year budget may request up to \$7,000,000. Each subsequent year may also request up to that amount but should not be escalated by any percentage per year above this amount; any inflationary increases should be absorbed by the increased effectiveness of the ICNO management. FastLane and Grants.gov will automatically provide a cumulative budget.

The proposal should provide all staffing and budgeting information needed to describe how the organization would fulfill the expectations in Sections I and II of this solicitation. Requested budget amounts for each year of the proposal should reflect the level considered necessary to perform the NSF-funded activities described in the proposal. Proposers should also be cognizant of budget constraints implied by the estimated funding levels provided under Section III.

A budget justification shall be submitted with the budgets for each year and shall be in sufficient detail to show how the proposer reached the amounts specified in the budget. NSF anticipates performing a detailed cost analysis of the successful proposal budget. Proposing organizations are required to follow the instructions in the Grant Proposal Guide, revised December 26, 2014 (Budget and Budget Justification, [http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg\\_2.jsp#IIC2g](http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/gpg_2.jsp#IIC2g) ).

Enter the anticipated total level of subrecipient support on line G5, Subawards, of the FastLane budget or line F5 of the R&R Budget Form in Grants.gov. Proposals require the inclusion of separate budgets for subrecipient agreements that exceed \$250,000 per year, with a budget justification and detailed explanation of the proposing organization's cost analysis of that budget, for a maximum of 3 pages each. Examples include budgeted months and salaries for personnel, quotations to support budgeted equipment, itemized listing of material and supplies with support quotations, statements of risk assessments and monitoring plans for each subrecipient, cost price analysis to support that the proposed subaward amounts are reasonable and copies of the subrecipient responsibility determinations, including adequacy of accounting system and financial capability. For subawards valued at less than \$250,000 year, include the costs in the aggregate on the subaward line in the budget.

Proposing organizations other than the incumbent must also provide a detailed budget for a transition period of up to four months preceding the new award. This information must be provided in an Appendix labeled Transition Budget and submitted as Supplementary Documentation. The budget must be presented in the same style with all applicable budget line items as for the budget for each year of the proposal. If a new Awardee is selected to manage and operate ICNO, the incumbent will cooperate with the successor to the extent necessary to facilitate uninterrupted support for ICNO during the transition period and will provide transfer of legal rights to relevant property and equipment. NSF will support appropriate transition costs incurred by a successor awardee if different from the current awardee.

Proposing organization may be asked to provide the following in support of the organization's financial condition and capability:

- A detailed structure and plan for implementing and monitoring business systems and internal controls for financial management and accounting, property standards, equipment standards, procurement standards, reporting and records management.
- Total compensation plan setting forth proposed salaries and fringe benefits for professional employees, with supporting information such as the names of recognized national and regional compensation surveys and studies of professional, public and private organizations used in establishing the total compensation structure.
- If available, the organization's annual audited financial statements (e.g. Balance Sheet, Profit and Loss Statement and Annual Reports) for the three most recent fiscal years and/or other documentation to clearly explain its current financial strength and resource capability.

A current indirect cost rate proposal and supporting financial data. If the organization's indirect cost rates have been approved by another Federal agency, provide copies of such agreements.

- A Current Cost Accounting Standards Board (CASB) Disclosure Statement or Cost Policy Statement.

Organizations that have not previously received NSF awards should review the NSF Prospective New Awardee Guide <http://www.nsf.gov/pubs/policydocs/pnag/pnag151.pdf> for additional guidance in preparing their budget submission.

## C. Due Dates

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- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 07, 2015

## D. FastLane/Grants.gov Requirements

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### For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

### For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <http://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: [support@grants.gov](mailto:support@grants.gov). The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

**Submitting the Proposal:** Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as [Exhibit III-1](#).

A comprehensive description of the Foundation's merit review process is available on the NSF website at: [http://www.nsf.gov/bfa/dias/policy/merit\\_review/](http://www.nsf.gov/bfa/dias/policy/merit_review/).

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in [Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018](#). These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

## A. Merit Review Principles and Criteria

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The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

### 1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

### 2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. ([GPG Chapter II.C.2.d.i.](#) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including [GPG Chapter II.C.2.d.i.](#), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two 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.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
  - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

### Additional Solicitation Specific Review Criteria

In the process of formulating an overall assessment of the viability of the proposer's management and operations plan for ICNO, reviewers will consider each of the areas below.

## 1. Management:

Reviewers will consider:

- the strengths and weaknesses of the plan for management and operation of ICNO;
- the quality, relevance and extent of the proposing organization's strategic vision to maintain and further develop ICNO's position as a world-class multidisciplinary and multi-user facility;
- the suitability, credibility and risks of any new proposed partnerships and their added value to ICNO and to NSF-supported science, education and outreach.

## 2. Operations, maintenance, environmental compliance, safety, health, and security

Reviewers will consider:

- the feasibility and potential for success of the proposed approach, including organizational structure, resource integration, provision of space and equipment, logistics support for scientific initiatives;
- data management and information technology, and maintenance, safety and security of systems and facilities;
- the sufficiency and potential for achieving effective results of the proposed methodology for assessing and improving ICNO performance.

## 3. Budgeting, staffing, and workforce management

Reviewers will consider:

- the adequacy of the proposed processes for managing the budget;
- the science and business management qualifications and experience of the organization's named personnel, and sufficiency and reasonableness of the proposed labor categories and level of effort;
- the suitability and potential for success of the proposed methods for recruitment and retention, promoting diversity at all levels in the organization;
- the relevance of the proposed plan to engage and develop intellectual talent, including groups underrepresented in the sciences, mathematics and engineering, in the conduct of ICNO research, education and operational support activities.

## 4. Science and facility planning

Reviewers will consider:

- the ability to respond to and prioritize evolving scientific and engineering needs and opportunities in the community, particularly in response to changing budgetary environments;
- the extent to which the planned activities target the critical goals relevant to the ICNO strategic vision, identify challenging scientific and technical questions or barriers to be overcome, identify performance measures for the planning and delivery process, and reflect appropriate and effective use of resources where possible.

## 5. Education, public outreach, and open access

With due consideration of the funding limitations, reviewers will consider:

- the extent and quality of the proposed activities to facilitate education and outreach, their potential for success, and the resulting impacts on identified target audiences;
- the suitability of proposed mechanisms to ensure broad and equitable access to ICNO among the relevant scientific research communities.

6. Transition Plan (all but incumbent): The Transition Plan will be evaluated to assess the proposing organization's ability to assume full responsibility for the management and operation of ICNO upon completion of the transition period without degradation of high-quality services, research efforts and facilities.

In addition, NSF will assess the organization's budgetary and financial information as part of the merit review and as outlined under Section V.B of this solicitation. The organization will be assessed for the adequacy of its internal accounting and operational controls (including human resources, property control and procurement systems), potential for attracting qualified employees, and the adequacy of its financial resources for managing ICNO. Proposed total costs will be evaluated by NSF for reasonableness and potential impact on funding available for science and related activities. The business evaluation will be used to help inform the Program Officer's recommendation for award.

## B. Review and Selection Process

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Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or Reverse Site Review.

The Panel Review (or Reverse Site Review if necessary) will have access to the ad hoc reviews and with its own deliberations will formulate an overall evaluation of each.

The panel review will have access to the ad hoc reviews, and with its own deliberations will formulate an overall evaluation of each proposal. The panel membership will include experts in business practices and management of scientific organizations. Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation. NSF staff's evaluation of the financial and business systems will be used to help inform the Program Officers review.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officers recommends to the cognizant Division Directors whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated

as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement.

Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

## VII. AWARD ADMINISTRATION INFORMATION

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### A. Notification of the Award

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Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

### B. Award Conditions

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An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)\*; or Research Terms and Conditions\* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

\*These documents may be accessed electronically on NSF's Website at [http://www.nsf.gov/awards/managing/award\\_conditions.jsp?org=NSF](http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

#### Special Award Conditions:

The award associated with this solicitation will be a cooperative agreement, not a standard grant or a contract. Any special requirements not stated herein will be negotiated at time of award.

Programmatic Terms and Conditions: The cooperative agreement(s) awarded as a result of this competition will be administered jointly by the Division of Polar Programs in the NSF Directorate for Geosciences and the Division of Physics in the NSF Directorate for Mathematical and Physical Sciences. The following are some of the measures NSF uses to conduct oversight for the cooperative agreement:

- Review of annual reports, program plans and performance metrics, and by site visits annually or as necessary.
- Review of research and education activities and management performance approximately midway through the five-year award;
- After the midway review, NSF may either invite the Awardee to submit a renewal proposal for an additional five-year period or issue a new solicitation.

NSF expects to involve funding agency representatives from foreign partner countries in annual or special reviews.

Financial and Administrative Terms and Conditions: Costs to be reimbursed in accordance with 2 CFR §200 –Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, or Federal Acquisition Regulation (FAR) Part 31, as applicable.

The awardee will be required to submit to an NSF Business Systems Review at least once during the award period.

### C. Reporting Requirements

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For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through [Research.gov](http://Research.gov), for preparation and submission of

annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide (AAG)* Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

The managing organization will be required to provide planning documents including an annual program plan (within three months of initial award, and annually no later than the end of February thereafter), along with reports as may be required by NSF. Under the Government Performance and Results Act (GPRA), NSF is required to report on the Federal Performance Goals for Facilities. Any and all facilities with an annual budget exceeding a specific threshold must report on their operations activities; and any and all construction/upgrade projects that exceed a total project cost of a specific threshold must report on their construction/upgrade activities. Therefore, the awardee will be required, upon request of the cognizant NSF program officer, to submit annual reports related to the GPRA performance goals. This may include the collection and submission of specific data related to the NSF GPRA requirements.

## VIII. AGENCY CONTACTS

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*Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.*

General inquiries regarding this program should be made to:

- Vladimir Papitashvili, Program Director, Antarctic Astrophysics & Geospace Sciences, telephone: (703) 292-7425, fax: (703)292-9079, email: [vpapita@nsf.gov](mailto:vpapita@nsf.gov)
- James Whitmore, Program Director, Particle Astrophysics, telephone: (703) 292-8908, fax: (703)292-8908, email: [jwhitmor@nsf.gov](mailto:jwhitmor@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: [support@grants.gov](mailto:support@grants.gov).

## IX. OTHER INFORMATION

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The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at [https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic\\_id=USNSF\\_179](https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

*Facilitation Awards for Scientists and Engineers with Disabilities* provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions

regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
  - Send an e-mail to: [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov)
  - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

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The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, [NSF-50](#), "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and [NSF-51](#), "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton  
Reports Clearance Officer  
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