



National Science Foundation  
4201 Wilson Boulevard  
Arlington, VA 22230  
www.nsf.gov

### COOPERATIVE AGREEMENT(CA)

**AWARD:** OPP-2042807

**EFFECTIVE DATE:** April 1, 2021

**EXPIRATION DATE:** March 31, 2026

**PROJECTED TOTAL AWARD FUNDING:**

(Subject to availability of funds)  
\$38,380,300

**CUMULATIVE AMOUNT:**

\$5,332,687

**SOLICITATION:**

(Incorporated by reference, as amended)

NSF 20-568

Antarctic Research

**CFDA NUMBER:**  
47.078

**OTHER AWARDS UNDER THIS PROGRAM:**

Show List of Awards

**AWARDEE:** University of Wisconsin-Madison

**PROJECT TITLE:** Management and Operations of the IceCube Neutrino Observatory 2021-2026

**PROJECT ABSTRACT:** <https://www.fastlane.nsf.gov/servlet/showaward?award=2042807>

<u>Principal Investigator(s)</u>	<u>Proposal No.</u>	<u>Institution (s)</u>
Francis Halzen	OPP-2042807	University of Wisconsin-Madison
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University of Wisconsin-Madison

**NSF Contact Information:**

Financial/Administrative questions: e-mail your NSF Grants and Agreements Official, Taina Munoz-Mulero, at [tmunozmu@nsf.gov](mailto:tmunozmu@nsf.gov) or call the Division at 703-292-5013 .

Programmatic questions: e-mail your NSF Program Officer, Vladimir Papitashvili, at [vpapita@nsf.gov](mailto:vpapita@nsf.gov) or call the Program Division at 703-292-7425 .

This CA is entered into between the United States of America, represented by the National Science Foundation (NSF), and the above named Awardee pursuant to the authority of the National Science Foundation Act of 1950, as amended (42 USC 1861-1875). This CA is provided electronically to the Awardee. The Awardee is responsible for full compliance with all Programmatic and Financial/Administrative Terms and Conditions as initially stated or as updated over the life of this CA. The Awardee's request to draw down funds under this CA will represent acceptance by the Awardee of all Terms and Conditions of the CA. The Authorized Organizational Representative (AOR) will be electronically notified of any changes to these Terms and Conditions and is encouraged to immediately review these changes and contact the Grants and Agreements Official or Program Officer within thirty days with any questions.

**Financial/Administrative Terms and Conditions (FATC):**

Award Specific FATC:

Part 1. Award Specific Financial and Administrative Terms and Conditions (FATC)

1.1 Award Interpretation

a. See the General Terms and Conditions section of the Award Notice for terms and conditions incorporated by reference to this agreement.

b. Deviations from the Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the Modifications and Supplemental Financial & Administrative Terms and Conditions for Major Multi-User Research Facility Projects and Federally Funded Research and Development Centers (CA-FATC for MMURFPs and FFRDCs), to meet the specific needs and requirements of this CA are provided herein.

1.2 Funding

a. Anticipated Total NSF Funding. In accordance with the CA-FATC Article entitled "Cooperative Agreement Increments", contingent on the availability of funds, satisfactory scientific/technical progress, and fulfillment of any special conditions of the award, it is the intent of the NSF to provide a total of \$38,380,301 over the term of five years, split equally between the GEO/PLR and MPS/PHY divisions.

b. Initial Provision of Funds. Partial incremental funding for project year one (PY1) in the amount of \$5,332,687 is provided at the

time of award to support IceCube Neutrino Observatory Management & Operations (ICNO/M&O) activities in accordance with the revised budget dated March 12, 2021.

c. Funding Schedule. Provided the conditions described in 1.2a are met, NSF intends to issue funds in accordance with the following schedule:

**PY Period Amount**

1	04/01/2021 - 03/31/2022	\$7,110,249
2	04/01/2022 - 03/31/2023	\$7,249,194
3	04/01/2023 - 03/31/2024	\$7,653,912
4	04/01/2024 - 03/31/2025	\$8,030,583
5	04/01/2025 - 03/31/2026	\$8,291,363

d. Carryover of Uncommitted Funds. The awardee may carry over uncommitted funds in an amount not to exceed fifteen percent (15%) of the program year funding unless otherwise approved in writing by the NSF Program Officers. The awardee shall include a forecast of program year uncommitted funds in the annual progress report. Uncommitted Carryover is defined as the amount of funding available at the end of each program year that has not been expensed or committed (encumbered), which is then carried over via program year-end budget processing for use in the next program year. Uncommitted funding in excess of 15% percent will be deducted from the following program year budget, unless otherwise approved in writing by the NSF Program Officers.

e. Limitation on Reallocation of Funds. Written approval is required from the NSF Program Officers for reallocation of funds in excess of \$250,000 from the annually approved ICNO/M&O Plan when such reallocation will occur across Control Accounts in the M&O WBS. The awardee will document reallocation of funds through the IceCube M&O change control process.

**1.3 Common Fund.**

a. Background: The Institutions of the IceCube Collaboration (the Collaboration) established a Common Fund in April 2007 to enable collaborating organizations to contribute to the cost associated with the ICNO detector computer hardware and software. Since then, the Common Fund has been managed in separate account(s) by the University of Wisconsin-Madison (UW). The Common Fund receives annual contributions from each partner institution or funding agency based on the number of PhD-level researchers from that institution or related funding agency.

b. Fund Oversight: The awardee must maintain full accounting of U.S. and international Common Fund contributions. The Common Fund contributions and expenses will be reviewed at least annually by NSF to ensure that the overall funding is sufficient to cover Common Fund activities. These activities are defined in the Memorandum of Understanding (MOU) dated May 2010, supplemented with the scope of work for each collaborating institution which is updated annually. The terms and conditions of this agreement apply in full to the Common Fund contributions funded with this award.

c. Common Fund Expenses - Within 60 days from the effective date of this award, the awardee agrees to work with NSF in developing a forecast for Common Fund expenses for the award period.

1.4 Indirect Cost Rate. A 55.00% indirect cost rate for PY1 and a 55.50% indirect cost rate for PY2 to PY5 shall be applied by the awardee for this cooperative agreement. These rates are in accordance with the Colleges and Universities Rate Agreement with the Department of Health and Human Services (HHS) dated May 15, 2020, which is hereby incorporated by reference. Within 120 days from the effective date of this award, the awardee agrees to work with NSF in determining the correct indirect cost rate application to the Common Fund.

1.5 Financial Oversight of NSF Funds. The awardee is responsible for the financial oversight and reporting of the NSF-funded portion of IceCube M&O support. The awardee will account for all NSF-funded M&O costs incurred under this award separately from any M&O funding provided by NSF under previous NSF awards or other non-NSF funding received.

## 1.6 Property

In addition to the requirements of the CA-FATC entitled "Equipment", as modified by the CA-FATC for MMURFPs and FFRDCs, the following apply to this cooperative agreement:

- a. All property for which the awardee had accountability under NSF Cooperative Agreement No. 1600823 is hereby transferred to this CA, to include property purchased with NSF funds contributed to the Common Fund. The property inventory provided by the awardee, dated March 25, 2021, shall be made part of this Agreement. Information on the property transferred to this CA will be updated when the closeout inventory report for 1600823 is submitted to NSF. Title to all equipment shall be vested in the awardee.
- b. NSF retains an interest in equipment having an acquisition cost of \$5,000 or more that transferred from previous NSF ICNO management and operations awards to Award No. 1600823, and subsequently to this CA, as well as new equipment purchased under this CA.
- c. Equipment purchases under this award with U.S. and international contributions to the Common Fund shall be accounted for under the award consistent with Property Standards in 2 CFR 200.
- d. The awardee will ensure that acquisition and any subsequent modification of NSF property is not compromised by non-NSF funding sources. Property attached or used to modify or enhance NSF funded property becomes inventoried property under this cooperative agreement that must be managed consistent with Property Standards in 2 CFR 200.

## 1.7 Master Site Plan

A Master Site Plan shall be submitted annually for the facility in accordance with the CA-FATC Supplement for MMURFPs and FFRDCs entitled "Master Site Plan"

## 1.8 Other Funding

Reserved

## 1.9 Additional Contract Requirements

In addition to the requirements of the Supplemental CA-FATCs for MMURFPs and FFRDCs article entitled, "Contract Requirements," the following apply under this cooperative agreement:

- a. As used in this article, the term contract applies to any agreement defined as a contract in accordance with 2 CFR 200.331, "Subrecipient and Contractor Determinations," of the Uniform Administrative Requirements and requiring NSF approval in accordance with the Supplemental CA-FATCs for MMURFPs and FFRDCs article entitled, "Contract Requirements".
- b. The Foundation authorizes the awardee to enter into the proposed contracts and to fund such arrangements up to the amount indicated in the approved budget as listed below.

Contractor	Amount
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Reserved

- c. The awardee will submit to NSF, through its electronic systems, a request for prior approval at least 30 calendar days in advance of the anticipated start date of any contract requiring NSF approval. Incomplete or insufficient requests will be returned without approval, for proper completion by the awardee. Upon receipt of a complete and sufficient request, NSF will review and provide a determination within 30 calendar days. In addition to the requirements of "Contract Requirements" regarding the contents of the request, the documentation shall clearly indicate that the proposed action is a contract.

d. The Awardee shall make all contracts and other commitments in its own name and shall not bind or purport to bind the Government or NSF.

#### 1.10 Subaward Requirements:

In addition to the subaward requirements of Article 8., Section a entitled, "Subawarding or Transferring Part of an NSF Award (Subaward)," of the CA-FATCs, the following requirements apply under this cooperative agreement:

a. Definition: As used in this article, the term significant subaward includes awards made to subrecipients regardless of form in accordance with the subaward definition in 2 CFR 200.331, "Subrecipient and contractor determinations," of the Uniform Administrative Requirements.

b. Request for Subaward Approval: The awardee will submit electronically to NSF a request for prior approval at least 30 calendar days in advance of the anticipated start date of any significant subaward. Incomplete or insufficient requests will be returned without approval, for proper completion by the awardee. Upon receipt of a complete and sufficient request, NSF will review and provide a determination within 30 calendar days.

The documentation shall include the items, as appropriate, below:

- 1) Clear identification of the proposed action as a subaward;
- 2) A description of the scope of work;
- 3) Identification of the subawardee and an explanation of why and how the proposed subawardee was selected;
- 4) The proposed budget and budget justification for the subaward, together with the Awardee's analysis thereof;
- 5) Basis for its determination of reasonableness of the proposed budget and a determination of responsibility of the recipient;
- 6) Special terms, unusual conditions and any changes to the awardee's internal controls that would be necessary to administer the subaward.

c. Award and Administration: The awardee shall insert a clause in all subawards reserving the Awardee's right to assign the subaward to any third party at NSF's direction should a successor awardee be selected by the NSF. The subawardee shall not assign or delegate its rights or responsibilities under any sub recipient agreement without prior written permission from the Awardee, and any assignment without such permission shall be void.

d. The Foundation authorizes the awardee to enter into the proposed subawards and to fund such arrangements with funds at the respective amounts listed below.

Organization	Amount
Lawrence Berkeley National Laboratory	\$487,364
Pennsylvania State University	\$428,914
University of Delaware	\$905,724
University of Maryland	\$3,378,278
University of Alabama	\$156,650
Michigan State University	\$565,760

1.11 Reporting Classifiable Information. In addition to the requirements of the CA-FATC Article entitled "Reporting Classifiable

Information", the awardee agrees that no NSF buildings, facilities, or equipment used in whole or in part for NSF-supported research, will be used for any classified research projects.

1.12 Information Security. In accordance with the CA-FATC for MMURFPs and FFRDCs, Article entitled "Information Security," within 60 days of the effective date of this award, the Awardee shall submit via Research.gov, Interim Reporting module a written summary of the policies, procedures and practices employed by the awardee as part of the awardee's IT security program, in place or planned, to protect research and education activities in support of the award.

### **Programmatic Terms and Conditions (PTC):**

Award Specific PTC:

#### **Part 2. Award Specific Programmatic Terms and Conditions (PTC)**

2.1 Program Description. The ICNO is the world's first high-energy neutrino detector, located deep within the ice cap under the U.S. Amundsen-Scott South Pole Station in Antarctica. The neutrinos are detected through their interactions in or near the cubic kilometer IceCube array of 5160 optical sensors that constitute this detector. These interactions produce high-energy muons (charged particles) that pass through the detector providing a way to determine the arrival direction and energy of the primary neutrino. With the discovery in 2013 of the first neutrinos from beyond our Solar System and the identification in 2017 of a high energy neutrino from a potential source of cosmic rays, the ICNO demonstrated that it has opened a new window on the Universe, providing unique data on the engines that power active galactic nuclei, the origin of high-energy cosmic rays, the nature of gamma-ray bursts, the activities surrounding supermassive black holes, and other violent and energetic astrophysical processes. The purpose of this award is to provide funding for the continuing exploitation of the Observatory for new discoveries and exciting science.

2.2 Mission. The mission of ICNO/M&O is to operate and maintain the IceCube high-energy neutrino detector located at the South Pole, and to coordinate the research effort with IceCube researchers worldwide towards the goal of exploiting ICNO fully for science and education.

2.3 Specific Duties of the Awardee. The Awardee will plan, staff, execute, and manage the maintenance and operations of the IceCube Neutrino Observatory, a major facility of the NSF. The awardee will operate and maintain ICNO in accordance with the operational requirements, policies and procedures set forth in the ICNO Management & Operations Plan (M&O Plan). Specific activities will be described and submitted for approval via this Plan. Specifically, the Awardee will:

- a. Operate and maintain the ICNO infrastructure, manage the Observatory technical and scientific staffs (including subawardees), as well as all activities carried out by the IceCube Collaboration and partners according to current best practices and in full compliance with all relevant laws and regulations, including National Security requirements.
- b. Provide upgrades, enhancements, and new services as required and within available resources to ensure community access to state-of-the art facilities and support.
- c. Recruit, develop and retain qualified scientific, education, engineering, and administrative staff. Review management staff, policies and procedures as needed.

- d. Coordinate and provide technical support for NSF-funded awards to other organizations requiring access to IceCube data in accordance with the requirements defined in the annual M&O Plan.
- e. Assist NSF in developing and implementing strategic partnerships with U.S. universities, federal, non-federal, and international organizations that will enhance the scientific capabilities and support available to the entire polar scientific community in accordance with the requirements defined in the annual M&O Plan.
- f. Consult with advisory committees and the Collaboration to help ensure that IceCube facilities and services are responsive to the Collaboration's needs.
- g. Develop and use appropriate methods to determine the effectiveness of management performance for ICNO. Develop and use appropriate methods to monitor and improve the awardee's interactions with ICNO primary stakeholders.
- h. Work with the Collaboration to define the activities and costs for which the Common Fund will be expended.

2.4 Quality Objectives. In performing the awardee's specific duties in support of the ICNO mission, the awardee will be required to plan for and demonstrate continuing progress in the following areas:

- a. Ensuring that the ICNO/M&O activities meet the established operational requirements.
- b. Responding to the community of ICNO users by addressing questions and communicating future plans for ICNO.
- c. Using effective performance measures or performance metrics.
- d. Continuing to improve the representation of women and underrepresented minorities in the ICNO workforce.
- e. Enhancing the capabilities of its technical, financial and management systems to support ICNO maintenance and operations.

## 2.5 Project Governance

- a. Overall Organization. The IceCube Neutrino Observatory is managed by the awardee and is overseen by an international IceCube Collaboration. The National Science Foundation (NSF) provides funding for U.S. activities and overall program oversight.
- b. ICNO Operations Organization. The awardee's ICNO Operations Organization is responsible for reliable overall management, operation of the IceCube detector, data management, and the full exploitation of the IceCube scientific program. The ICNO Operations Organization is located within UW's Wisconsin IceCube Particle Astrophysics Center. The WIPAC is the primary interface to the university administrative and support, including accounting, purchasing, human resources, and other general administrative support. The Operations Organization has five primary elements: Program Management, Detector Maintenance & Operations, Computing & Data Management, Triggering & Filtering and Data Quality, and Reconstruction & Simulation Tools.
  - 1) Program Management. Activities will include Management and Administration, Engineering, Science and R&D Support, USAP Logistics, Safety, Software Coordination, Coordination of Education and Outreach, Distributed Computing infrastructure, and other services typically provided by a scientific host laboratory.
  - 2) Detector Maintenance & Operations. The awardee's proposed objectives shall demonstrate high data quality, meet necessary data throughput rates, provide a secure archive and appropriate technical documentation, follow accurate maintenance and upgrade procedures, maintain a problem reporting system, follow a cost-effective upgrade strategy, maintain a software library and revision history, and demonstrate overall system sustainability. Areas included under this element are: Run Coordination, Data Acquisition (DAQ), Online Filters (P&F), South Pole System (SPS) and South Pole Test System (SPTS), Experiment Control (IceCube Live), Monitoring, Calibration, Surface Detector Operations and Supernova Operations.
  - 3) Computing & Data Management. Activities will include: filtering data at South Pole for satellite transmission and incorporating data into the Data Warehouse; maintenance of Data Warehouse and UW Data Center and support the Distributed Computing infrastructure; maintenance of data archiving system, networking and security infrastructure, core online/offline software code repository and build system; maintenance of the simulation production software and coordination for the production data stream and simulation stream, and maintenance of the data processing software and verification software framework.

4) Triggering & Filtering. Activities will include coordination of the Trigger, Filter and Transmission (TFT) board and develop and verify Physics Filters and code for pole filtering. The TFT board evaluates proposals and executes plans to ensure that the IceCube detector operates in a configuration that meets the physics needs of the Collaboration while ensuring that the limited resources available from the South Pole System are utilized. The Physics Filters that select events for immediate transmission to the Northern Hemisphere must be evaluated for further analysis to ensure that they meet the evolving physics needs of the Collaboration and that the most effective reconstruction and filtering tools are in use online.

5) Data Quality, Reconstruction & Simulation Tools. Activities will include managing Simulation Software tools and maintaining detector simulation software (IceSim), maintaining and verifying simulation of Event Generation, Photon Propagation, and Geometry Calibration; developing core common Reconstruction Tools in order to process raw waveform data to ultimately reconstruct muon tracks, shower events, direction, energy, and background probability of in-ice events, as well as to reconstruct cosmic-ray air showers; developing and maintaining high level Analysis Tools to maximize the efficiency of turning reconstructed data into physics results; performing Data Quality checks to support final selection of science-ready data and coordinating, developing and monitoring common reconstruction for Offline Data Processing.

#### c. Advisory Groups

1) Software & Computing Advisory Panel. The ICNO Software & Computing Advisory Panel (SCAP) is composed of experts in the fields of software development and scientific computing. The SCAP advises the awardee's PI and Co-PIs and the Collaboration on the following topics: on-line computing; on-line and off-line data processing and filtering; off-line computing facilities; and simulations and analysis support. The Panel provides a written report to the awardee following each meeting.

2) Science Advisory Committee. The Science Advisory Committee (SAC) provides advice to the awardee's PI and Co-PIs and to the Collaboration on the IceCube scientific program and evaluates the effectiveness of support provided by the operations organization and the contributions of the IceCube collaborating institutions. The Committee provides a written report to the awardee following each meeting.

#### d. Key External Organizations

1) The IceCube Collaboration. The IceCube Collaboration currently consists of 53 institutions in 12 countries and approximately 300 students, postdocs, faculty, and other researchers. The ICNO/M&O is a collaborative effort involving UW and the rest of the IceCube Collaboration for operation and management of the centralized core activities at the South Pole Station and UW, and distributed M&O

activities at the other collaborating institutions. These activities are supported by NSF under this award and by a Common Fund, consisting of funding as well as in-kind contributions, provided by the IceCube Collaboration. Every IceCube institution will contribute to M&O, to service activities associated with normal experiment run monitoring, calibration, and data validation, and to analysis activities. Institutions outside the U.S. are supported by their respective national funding agencies.

2) The International Oversight and Finance Group (IOFG): The IOFG is a committee created in 2004 to collaborate and share information amongst NSF and other partner agencies about the issues related to funding and operational needs of the IceCube Project (including construction phase, M&O and research phases, and sunset phase) or issues that may affect the future of the IceCube Project. The IOFG is currently comprised of representatives of the funding agencies from Belgium, Germany, Sweden, Japan, and the United States. All these countries but Japan participated in the construction of the IceCube Neutrino Observatory. The IOFG is chaired by the cognizant NSF Program Officers.

## 2.6 Planning Requirements

a. ICNO Management & Operations Plan (M&O Plan). Within 60 days of receipt of this award, the awardee will submit the M&O Plan to NSF. The M&O Plan should be structured along the same lines as the Operations Organization described by 2.5.b and address at a minimum each of the Quality Objectives described by 2.4 above. The M&O Plan will be updated annually and submitted for NSF approval together with the annual progress report within 90 days prior to the annual expiration date. The M&O Plan will describe the management, roles and responsibilities, lines of authority and communications, critical or significant project activities, and performance objectives and annual milestones. In addition, the M&O Plan will provide a clear summary of budget amounts and funding received by the ICNO, for the entire period of performance of this award, and at the minimum must include the following financial information:

i. annual budget and allocations of the various funding sources, including the NSF funding provided through this award;



- ii. annual Common Fund forecast, contributions, and expenses;
- iii. in-kind contributions presented separate from direct funding sources and Common Fund contributions; and
- iv. costs incurred in previous years and any carryover balance.

The awardee will send the approved M&O Plan to each of the non-U.S. IOFG members.

b. Memorandum of Understanding (MOU). Within 60 days of this award, the awardee must provide an update on the existing (and new if necessary) MOUs with all U.S. and foreign institutions in the Collaboration that will perform M&O and related service activities and submit the signed MOUs to NSF. The MOU includes commitments to all M&O tasks to be carried out by the overall collaboration, including those supported by the Common Fund, and through in-kind support, and by funding provided through this agreement.

The MOU will also include the commitments to service activities by each collaborating institution. The awardee will provide the MOUs to the IOFG for review and to take cognizance of the commitments made by the overall collaboration, and in particular, commitments by the institutions to which their funding agencies provide support. The MOUs and addenda shall be updated and re-submitted as changes occur, typically on an annual basis.

c. Integration and Coordination. The awardee is responsible for integrating the contributions to M&O by all participating organizations. Activities in support of this key responsibility shall be included in all required plans and reports. The awardee will operate or coordinate centralized core activities, including operations of core computing systems, networking at Wisconsin and South Pole, data warehouse, data acquisition system maintenance, online filtering and maintenance of test facilities, instrumentation research and development, science and technical support, general management and administration, and education and outreach. The awardee will also coordinate the distribution of service activities such as routine monitoring, calibration and event simulation tasks that are to be performed by members of the Collaboration as part of their own base grant support.

## 2.7 Reporting Requirements

a. Electronic Submissions. The awardee will provide ad hoc and regular reports as designated by the NSF cognizant Program Officials and Grants and Agreements Officer with content, format, and submission timeline established by the NSF cognizant Program Officials. The awardee will submit all required reports via Research.gov using the appropriate reporting category; for any type of report not specifically mentioned in Research.gov, the awardee will use the Interim Report function in FastLane to submit reports.

b. Annual Report. The awardee will submit annual reports through Research.gov within 90 days prior to the project's annual expiration date. The report will describe progress made based on milestones and objectives in the approved annual M&O Plan. Significant differences between planned and actual accomplishments will be discussed. The report will consist of a summary of work accomplished during the reporting period, including major technical accomplishments and an assessment of current or anticipated problem areas and corrective actions, and progress in project governance. Approval of the Program Officers is required prior to receipt of scheduled incremental funding.

c. Interim Reports. This agreement requires one 6-month interim progress report on the status of all M&O activities under this award. The awardee will submit to the NSF Program Officers a summary, including a section on the overall status and performance of the data handling and detector systems. It will also include highlights and accomplishments, specific comments on detector performance such as uptime and scheduled maintenance, commissioning status, failures, software releases and test results, major procurements planned or placed, an assessment of the overall labor effort, and any other performance data that is needed to characterize the overall data system performance. The report is due by the end of the sixth month of the current term. However, NSF reserves the right to require more frequent reporting if necessary.

d. The Final Report, which will include all 60 months of this award term, will be required within 120 days after the project's expiration date.

## 2.8 Awardee Support of Ongoing Management and Oversight

a. Annual Reviews. NSF will conduct reviews of the ICNO/M&O activities through annual site visits of cognizant Program Officers

that will address management issues, cost and performance objectives, and scientific and technical performance and issues. An external panel review covering, at a minimum, project management, cost and performance objectives, and scientific and technical performance will be organized after the second and fourth project years to inform NSF's decision on potential pathways for the support of ICNO/M&O activities beyond 2021. To the extent possible, NSF will invite IOFG members to participate in this review.

b. Point of Contact. The Project Directors for the awardee will serve as the point of contact for the NSF cognizant Program Officials, including providing notification of any critical project management issues such as changes in key personnel, cost, schedule, and management structure or procedures prior to implementing such changes. Notifications for changes in key personnel shall be submitted.

c. Commitment and Cooperation. The awardee will ensure full commitment and cooperation among the governing structure components and all program staff during all ongoing NSF program management and oversight activities. The awardee will ensure availability of key institutional partners during any desk or on-site review as well as timely access to all program documentation.

d. GPRA Reporting Metrics. The awardee will work with the NSF Cognizant Program Officials to define appropriate GPRA performance metrics for ICNO M&O.

## 2.9 NSF Required Clauses for Work Performed in Antarctica and Data Policy

a. Work performed in Antarctica. This award is subject to the Antarctic Conservation Act (ACA), 16 U.S.C. 2401. Violations of the ACA may result in civil or criminal fines up to approximately \$30,000, imprisonment for up to one year, and, where appropriate, administrative sanctions up to and including debarment.

b. Data Policy. The Director of the Office of Polar Programs (OPP) has established Guidelines and Award Conditions for OPP Scientific Data. The full document is available via the NSF web page at: NSF/OPP DCL 16-055 (<https://www.nsf.gov/pubs/2016/nsf16055/nsf16055.jsp>). The awardee must ensure the ICNO data plan is consistent with the referenced NSF data policy and guidelines.

c. Documented Policy. In concert with the proposal for this award, the awardee submitted a plan for data management, dissemination, and sharing of IceCube research results. This plan is included in the IceCube Collaboration Governance Document as Appendix E and available from the project's website (<http://icecube.wisc.edu/collaboration/governance>).

## 2.10 Key Personnel

a. Prior Approval. The individuals specified below are considered essential to the work being performed hereunder. Prior written approval of the cognizant NSF Program Officers and the NSF Grants and Agreements Officer is required for any changes in key personnel

Principal Investigator

Director of IceCube Operations

Associate Director for Science and Instrumentation

b. Other Critical Personnel. The cognizant NSF Program Officers shall be notified in advance of any changes to the proposed upper level management structure, overall management structure and the IceCube Collaboration Spokesperson.

## 2.11 Software Development

In addition to the requirements in CA-FATC for MMURFPs and FFRDCs, Article entitled "Software Development", the awardee shall notify the NSF Program Officer before modifying or removing from the open-source license website any educational video game developed under the award.

**Change History**

**Prior Awarded Funding Amount:**

Per Original Award on  
04/14/2021: \$5,332,687