

NSF-Simons Collaboration on a National Institute for Theory and Mathematics in Biology (NITMB)

PROGRAM SOLICITATION NSF 21-607



National Science Foundation

Directorate for Mathematical and Physical Sciences
Division of Mathematical Sciences

Directorate for Biological Sciences
Division of Integrative Organismal Systems
Division of Molecular and Cellular Biosciences
Division of Environmental Biology



Simons Foundation - Division of Mathematical and Physical Sciences

Preliminary Proposal Due Date(s) (required) (due by 5 p.m. submitter's local time):

December 01, 2021

Full Proposal Target Date(s):

July 18, 2022

IMPORTANT INFORMATION AND REVISION NOTES

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 22-1](#)), which is effective for proposals submitted, or due, on or after October 4, 2021.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

NSF-Simons Collaboration on a National Institute for Theory and Mathematics in Biology (NITMB)

Synopsis of Program:

The purpose of the NSF-Simons Collaboration on a National Institute for Theory and Mathematics in Biology (NITMB) is to support a research institute to enable innovative research at the intersection of mathematical and biological sciences to facilitate new developments of biology-inspired mathematical theories, methodologies, and innovative modeling approaches to advance the understanding of challenging biological problems. The institute should promote interdisciplinary education and workforce training between these two disciplines. The National Science Foundation Directorates for Mathematical and Physical Sciences (NSF/MPS) and for Biological Sciences (NSF/BIO) and the Simons Foundation Division of Mathematics and Physical Sciences (SF/MPS) shall jointly sponsor a new research institute to facilitate collaborations among groups of mathematicians (including statisticians and computational scientists) and biologists. Research activities conducted at the institute should be focused on emerging and important topics at the interface of the mathematical and biological sciences, with the expectation to develop new mathematical methodologies inspired by biological problems. The institute should primarily focus on advances in theory and mathematics that are motivated by and applicable to the analysis of complex biological systems. The institute will conduct interdisciplinary education and training through research involvement of doctoral degree recipients and graduate students from across this multi-disciplinary spectrum. The institute is also expected to conduct convening activities, including short-term and/or long-term visitor programs, workshops, and/or outreach activities. Diversity, equity, inclusion, and accessibility are expected to be core values of the institute and should be reflected in its research, education, outreach programs, and its leadership. The institute will serve as a national resource that aims to advance research in the mathematical and biological sciences through programs supporting discovery and knowledge dissemination in mathematical biology and enhancing connections to related fields.

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.

- Zhilan J. Feng, National Science Foundation, telephone: (703) 292-7523, email: NITMB@nsf.gov
- Jaroslaw Majewski, National Science Foundation, telephone: (703) 292-7278, email: NITMB@nsf.gov
- Sridhar Raghavachari, National Science Foundation, telephone: (703) 292-4845, email: NITMB@nsf.gov
- Elizabeth Roy, Simons Foundation, telephone: (212) 524-6966, email: eroy@simonsfoundation.org
- Samuel M. Scheiner, National Science Foundation, telephone: (703) 292-7175, email: NITMB@nsf.gov
- Junping Wang, National Science Foundation, telephone: (703) 292-4488, email: NITMB@nsf.gov

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

- 47.049 --- Mathematical and Physical Sciences
- 47.074 --- Biological Sciences

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 1

One. NSF and the Simons Foundation expect to co-fund the institute. The institute funded by this program will receive two separate awards of equal size, one from NSF and one from SF. The form of each of these award instruments shall be determined by the funding agency.

Proposals must be written with a five-year plan for research, training, outreach, and other Broader Impact activities. The plan and budget must reflect a ramp-up of the institute's activities during Years 1 and 2, with a full complement of activities implemented no later than the beginning of Year 3.

Anticipated Funding Amount: \$50,000,000

NSF and the Simons Foundation expect to co-fund the institute. The total amount available for this solicitation is \$50,000,000. Of this amount, NSF estimates that \$25,000,000 will be available to support one institute award for an initial period of five years. The Simons Foundation estimates that \$25,000,000 will be available to support the institute award over the five-year duration of the award. This plan is subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits on the PI for the allowable organizations listed above. Federal agencies and federally funded research and development centers (FFRDCs) can only participate as subawardees. FFRDCs and federal agency scientists cannot serve as lead PI. Non-NSF sponsored FFRDCs are required to provide a letter of collaboration from their agency as a Supplementary Document by following guidance in the NSF PAPPG for instructions.

Limit on Number of Proposals per Organization:

There are no restrictions or limits on the number of proposals per organization. However, there is a limitation on the number of proposals per PI, co-PI, or other senior personnel as noted below.

Limit on Number of Proposals per PI or co-PI:

An individual may appear as PI, co-PI, or other senior personnel on no more than two preliminary or full proposals submitted in response to this solicitation. Other senior personnel include lead PIs on subawards. There is no limitation on unpaid consultants. Please be advised that if an individual's name appears as PI, co-PI or other senior personnel on more than two proposals, all proposals submitted after the first two proposals (based on the time-stamp) will be returned without review. In the event a preliminary proposal is not invited for a full proposal submission, any PI/co-PI/other senior personnel from a declined preliminary proposal is free to join an invited full proposal team at the full proposal organization's and PI's discretion. However, NSF and SF should be notified regarding any personnel changes before the full proposal submission.

Please note: All materials should be submitted to NSF. NSF will share all submitted materials with the Simons Foundation. Additionally, the Simons Foundation does not use the role of co-PI. Individuals on the Simons Foundation budget must be designated as PI, co-Investigator ("co-I") or other role.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
 - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - 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: https://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:**

Projects will be jointly funded with the Simons Foundation. Half the budget must be prepared by following the NSF Proposal and Award Policies and Procedures Guide (PAPPG), and the other half of the budget must be prepared by following instructions from the Simons Foundation, included with the announcement of this funding opportunity at the Simons Foundation website (<https://www.simonsfoundation.org/mathematics-physical-sciences/funding/request-for-applications/>). Note that the Simons Foundation has a specific indirect cost rate policy.
- **Other Budgetary Limitations:**

Not Applicable

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):

December 01, 2021
- **Full Proposal Target Date(s):**

July 18, 2022

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

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

The development of new research tools and concepts has revolutionized our ability to better understand, interrogate, manipulate, and engineer biological systems at multiple scales and to measure their responses to changing environments. The ability to generate data across all spatial and temporal scales of biological organization has far outpaced the capacity for data integration/analysis as well as the development of mathematical, statistical, and computational models capable of supporting new discoveries of emergent phenomena and novel biological principles. This imbalance is creating tremendous opportunities for transformative developments in mathematics to advance biological research. The National Science Foundation Directorates for Mathematical and Physical Sciences (NSF/MPS) and for Biological Sciences (NSF/BIO) and the Simons Foundation Division of Mathematics and Physical Sciences (SF/MPS) are partnering to promote research at the interface of the mathematical and biological sciences by jointly sponsoring one new research institute to facilitate collaborations among groups of mathematicians (including statisticians and computational scientists) and biologists. This solicitation responds directly to the need to facilitate long-term collaborations between the biological and the mathematical sciences communities to leverage their complementary expertise, and to build capacity to address important basic research and societal challenges whose solutions are best solved by expertise at the intersection of disciplines.

The NSF-Simons Collaboration on a National Institute for Theory and Mathematics in Biology is a large-scale project that should have several important impacts, including:

- Advance research at the interface of mathematical and biological sciences by enabling impactful collaborations between mathematical scientists and biologists to reveal new insights of important and fundamental biological problems through developments of new mathematical theories, novel modeling and statistical approaches, as well as innovative computational methodologies;
- Foster research that is timely and potentially transformative, and assist rapid and broad dissemination of new ideas at the interface of mathematical and biological research;
- Increase and expand the talent base, with special attention to increasing diversity, equity, inclusion, and accessibility engaged in research at the interface of mathematical and biological sciences;
- Provide opportunities for students and postdoctoral fellows to interact with leading researchers in inclusive environments;
- Demonstrate leadership in promoting diversity in the mathematical and biological sciences;
- Provide opportunities for outreach to the scientific community and the public at large;
- Support the exchange of information with business, industry, government, and national laboratories, providing access to expertise in the mathematical and biological sciences;
- Play an important role in fostering international collaborations in mathematical and biological sciences.

The National Science Foundation and the Simons Foundation invite proposals for projects that contribute to this important, influential institute partnership activity. The National Science Foundation and the Simons Foundation intend that the award resulting from this competition will be a five-year cooperative agreement to the lead organization, with an additional five-year renewal possible based on an assessment of the Institute's achievement and availability of funds.

Support for each year of the cooperative agreement of a funded Institute will be contingent upon a satisfactory annual review and site visit or reverse site visit by NSF and the Simons Foundation of the Institute's progress and future plans, with an emphasis on the quality of the research, education, broadening participation and knowledge transfer activities.

In the fourth year of operation, with the approval of NSF and SF, the Institute may submit a renewal proposal for five additional years of NSF and Simons Foundation support. During the subsequent annual review, the Institute's achievements and future plans will be evaluated comprehensively to determine if the Institute is meeting its goals and objectives as well as the goals and objectives of the Program. This in-depth review will consist of an *ad hoc* review of the renewal proposal and a formal on-site review, involving external reviewers who will produce a written report to NSF and the Simons Foundation. An Institute successful in passing the fourth-year review will be continued for another five years, commencing at the beginning of the sixth year. An Institute that passes the fourth-year review will continue to be reviewed by NSF and the Simons Foundation every 12 months. An Institute that does not pass the fourth-year review will be phased-out over a two-year period following the initial five-year award period.

II. PROGRAM DESCRIPTION

The NSF-Simons Collaboration on a National Institute for Theory and Mathematics in Biology (NITMB) is a new program that expects to fund up to one new institute of five-years duration with a possible five-year renewal from this program solicitation. The NSF-Simons NITMB program seeks proposals that will advance research at the interface of mathematical and biological sciences and expand the talent base engaged in mathematical and biological research in the United States. Research activities conducted at the institute should be focused on emerging and important areas of mathematical biosciences. The Institute should primarily focus on advances in theory and mathematics that are motivated by and applicable to the analysis of complex biological systems. The institute is also expected to conduct interdisciplinary education and training through research involvement of doctoral degree recipients and graduate students from across the multi-disciplinary spectrum of mathematics and biology. Diversity, equity, inclusion, and accessibility are expected to be core values of the institute and should be reflected in its research, education, and outreach programs. The institute is further expected to conduct convening activities, including short-term and/or long-term visitor programs, workshops, and/or outreach activities at the interface of mathematical and biological sciences.

Mathematics is the language of physical sciences and, over the last several centuries, has advanced our understanding of the universe enormously. Unlike

physical systems where symmetries, self-similarity, and scale-invariance may provide powerful organizing principles, biological systems exhibit rich nonlinear dynamics at multiple scales (different time- and spatial-scales for different processes) that cannot be averaged away across the hierarchy of scales and processes. Despite the complexity of the biological systems, many believe that there are organizing principles, or rules, amenable to mathematical descriptions for biological systems. It is likely that a full understanding of complex biological systems will be limited, unless the rules and organizing principles are uncovered mathematically. As a result, there is a major opportunity for mathematicians to develop techniques, new concepts/theories, and modeling approaches for complex biological systems. Some motivating examples where new developments in biology have strong potential to spur new advances in mathematics include:

- **Genome Sciences:** Development of novel mathematical, statistical, and algorithmic approaches that significantly advance the analysis and understanding of the fundamental mechanisms of storage, propagation, and expression of genetic and epigenetic information. While mathematical techniques such as graph theory, topological data analysis, probability, and network approaches have been effective, new mathematical developments that would enable the assembly and the analysis of the evolution of genome sequences are anticipated.
- **Infectious Pathogens: Immunology and Transmission:** Modeling the evolutionary outcomes of host-pathogen interactions as dynamically coupled immunological and epidemiological processes is a grand challenge, particularly when models incorporate heterogeneities in attributes such as pathogen virulence, host defense mechanisms, and human intervention. New mathematical theory and modeling approaches are expected for exploring emergent properties of infectious pathogens, uncovering principles in immunology, and predicting effects on pathogen transmission dynamics, especially in the presence of multiple scales of time, space, and biological processes within changing environments.
- **Neuroscience:** Novel advances in mathematical approaches and rigorous theories, such as topological and computational methods for describing and extracting macroscopic activity states of neural populations and deriving principles of their emergence from underlying synaptic, cellular and network dynamics. There is also considerable promise in analyses and applications of learning algorithms as multiscale dynamical systems.
- **Evolution of Shape and Form:** A remarkable difference between classical engineered materials and living matter is the ability of the latter to grow and remodel in response to developmental processes and evolutionary pressures. The growth and form of such living materials is representative of active tissue mechanics posing major challenges to models based on differential geometry, shape analysis, and nonlinear mechanics. New mathematical developments that extend our understanding of how variation arises both through natural selection (on evolutionary time scales) and during development (on embryological time scales), and the interaction of those two processes are essential.
- **Biological Systems on a Changing Planet:** Climate change, with its effects on and feedbacks with biological systems, presents a critical scientific challenge. Emergent properties of dynamic and complex biological networks, as well as assumptions at each level of biological organization compound uncertainty and error in theory and models. While current mathematical techniques such as dynamical systems, causal inference theory, stochastic systems, and graph theory have been effective, the development and application of novel mathematics will be essential for studying the effects of climate change on complex multiscale biological systems and making robust predictions with quantifiable uncertainties.

This list is by no means exhaustive or limiting. However, scientific topics that fall outside of the purview of the funding Divisions will have a lower priority. The National Science Foundation and the Simons Foundation are particularly interested in proposals that are creative, demonstrate vision, and involve the fullest spectrum of the mathematical and biological sciences appropriate to the proposed institute's mission. The structure of the proposed institute is left unspecified, but a critical mass of strong research groups with long term appointments from the hosting institution for the group leaders is anticipated. The National Science Foundation and the Simons Foundation encourage prospective applicants to propose creative institute structures with high quality and mutually cohesive core research programs that would increase the potential to transform the landscape and integration of the mathematical and biological sciences as well as increase the diversity of researchers and students trained at the intersections of these fields.

The NSF-Simons NITMB program supports basic research in mathematical and biological sciences. Institute proposals primarily motivated by human pathogenesis or disease etiology research or clinically relevant focus areas are not appropriate for this program and may be returned without review.

The following considerations should inform the proposed institute activities.

National Resource of Excellence: The activities in the new Institute should involve the mathematical and biological sciences community on a national and/or international scale. The institute research program should consist of several strong research threads with focused projects on emerging topics encompassing the breadth of mathematical and biological sciences. The Institute must have programs open to applications from members of the entire relevant communities across the nation. The visitor and conference programs should be open to both domestic and international researchers. The Institute should accept activity proposals from the community on emergent topics in mathematical biology. These activities will be conducted at the institute. The institute should be an inclusive environment, where the values of diversity, equity, inclusion, and accessibility are evident at all levels of institute function, from leadership to visitor and talent development programs.

The institute activities should be subject to advising and assessment by a distinguished External Advisory Board with broad membership drawn from the mathematical and biological sciences communities. The roles of the external advisory board members must be specified in the External Advisory Board section of the proposal, required as a Supplementary Document, and no individuals or potential individuals of the advisory board should be named therein.

While institute programs will often naturally involve foreign participants, the bulk of NSF funding for participants in institute programs is expected to support U.S.-based participants, reflecting the investment of U.S. federal funds in the National Institute for Theory and Mathematics in Biology.

Talent and Workforce Development: The institute is expected to play a significant role in the training through research involvement of the next generation of diverse mathematical and biological scientists, who would be able to understand and challenge each other and conduct high quality, creative research that will move the fields forward. The institute activities should address how the training of the next generation of scientists will be integrated with the research programs of the institute.

Knowledge Dissemination, Diversity, Equity and Inclusion: The Institute activities are expected to catalyze and disseminate new discoveries at the interface of mathematical and biological sciences. The Institute must have a plan for the selection of participants and the allocation of funds, a plan reflecting a proactive approach to diversity, equity, inclusion, and accessibility, and how the plan will be implemented successfully. In addition to the primary goals in research advancement and talent development, the Institute is expected to provide highly visible venues for outreach to the general public as well as to the scientific community broadly.

Evaluation and Reporting: Projects on the scale of National Institute for Theory and Mathematics in Biology call for regular, ongoing evaluation to monitor and evaluate progress in meeting goals, to provide feedback, and to suggest potential changes and improvements. The NSF-Simons NITMB award will be subject to specific reporting requirements about the programmatic activities and the participants involved. In addition, proposals should describe plans for evaluation during the course of the institute activities and for summative evaluation of progress toward the Institute's goals.

In short, a successful proposal should describe the vision for the proposed institute to serve as a national resource in research and talent building at the forefront of mathematical biology; the challenges motivating this vision; and the rationale for an institute to address these challenges. It should define the mission and goals of the proposed institute; describe how these goals will be achieved, together with appropriate measures to evaluate progress toward these goals; and make a compelling case for the institute's national scope and anticipated impact on the mathematical and biological sciences. It should indicate the governance

and management structure of the proposed institute; describe the process of generating, selecting, and evaluating the activities of the proposed institute; and delineate criteria for the selection of participants and the allocation of funds. It should contain a plan reflecting a proactive approach to diversity; describe how this plan will be implemented; and outline how its outcomes will be measured. It should address the ways in which training of the next generation of mathematical and biological scientists will be integrated with the research program of the proposed institute; and discuss plans for outreach activities and the dissemination of knowledge generated at the proposed institute.

REVIEW PROCESS OVERVIEW:

Preliminary proposals: All proposers intending to submit a full proposal in response to this activity must submit a preliminary proposal. Preliminary proposals will be reviewed by NSF and SF with external reviewer input.

Full Proposals: NITMB full proposals will be by invitation only, and binding decisions to invite or not invite a NITMB full proposal will be made based on the results of the review of preliminary proposals. NITMB full proposals will receive ad hoc and/or panel review and/or site visits and/or reverse site visits at the discretion of the Program, as described in Section VI of this Solicitation.

III. AWARD INFORMATION

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

NSF and the Simons Foundation expect to co-fund the institute. NSF estimates that \$25,000,000 will be available to support one institute award for an initial period of five years. The Simons Foundation estimates that \$25,000,000 will be available to support the institute award over the five-year duration of the award.

Based on prior experience, it is expected that Institutes of this scale would require a two-year period to ramp-up activities to be fully operational. As such, the award budget in years one and two are expected to be \$6,000,000 - \$7,500,000 and \$7,500,000 - \$9,000,000, respectively, from combined NSF and the Simons Foundation sources. The institute will ramp-up to an annual budget of \$10,000,000 for years 3-5 from combined NSF and the Simons Foundation sources.

This is a partnership between NSF and the Simons Foundation, therefore meritorious proposals will be funded jointly by two organizations. The institute funded by this program will receive two separate awards of equal size, one from NSF and one from SF. The form of each of these award instruments shall be determined by the funding agency. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency.

With the approval by NSF and SF, in the fourth year of the cooperative agreement, the award institute may submit a renewal proposal for up to five additional years of support. The invitation to submit a renewal proposal will be dependent upon the progress of the institute in reaching the goals for the institute as outlined in this solicitation and whether the Institute's scientific focus areas remain aligned with the areas supported by the participating funding Divisions. The renewal proposal will undergo external reviews that may also involve site visits and is subject to the availability of funds. At the conclusion of the review of a renewal proposal, NSF and SF will inform the awardee whether the institute's activities warrant renewal for an additional five-year period, or whether a plan must be put into effect for phase-out of NSF and/or SF support. If the decision is made to not renew the Institute, a phase-out proposal of two-year duration may be requested by NSF and SF.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits on the PI for the allowable organizations listed above. Federal agencies and federally funded research and development centers (FFRDCs) can only participate as subawardees. FFRDCs and federal agency scientists cannot serve as lead PI. Non-NSF sponsored FFRDCs are required to provide a letter of collaboration from their agency as a Supplementary Document by following guidance in the NSF PAPPG for instructions.

Limit on Number of Proposals per Organization:

There are no restrictions or limits on the number of proposals per organization. However, there is a limitation on the number of proposals per PI, co-PI, or other senior personnel as noted below.

Limit on Number of Proposals per PI or co-PI:

An individual may appear as PI, co-PI, or other senior personnel on no more than two preliminary or full proposals submitted in response to this solicitation. Other senior personnel include lead PIs on subawards. There is no limitation on unpaid consultants. Please be advised that if an individual's name appears as PI, co-PI or other senior personnel on more than two proposals, all proposals submitted after the first two proposals (based on the time-stamp) will be returned without review. In the event a preliminary proposal is not invited for a full proposal submission, any PI/co-PI/other senior personnel from a declined preliminary proposal is free to join an invited full proposal team at the full

proposal organization's and PI's discretion. However, NSF and SF should be notified regarding any personnel changes before the full proposal submission.

Please note: All materials should be submitted to NSF. NSF will share all submitted materials with the Simons Foundation. Additionally, the Simons Foundation does not use the role of co-PI. Individuals on the Simons Foundation budget must be designated as PI, co-Investigator ("co-I") or other role.

Additional Eligibility Info:

Proposals submitted in response to this solicitation cannot be duplicates of proposals to any other Federal agency for simultaneous consideration.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals (required): Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

Separately submitted collaborative proposals will not be accepted. Funding to partner organizations must be through subawards.

Preliminary Proposal Contents: The preliminary proposal should consist of the following elements:

- **Cover Sheet:** For planning purposes, July 01, 2023 should be shown as the start date. Be sure to check the block indicating that a preliminary proposal is being submitted. Proposers are reminded to identify the program solicitation number, identify the Division of Mathematical Sciences as the organizational unit and the Mathematical Sciences Research Institutes as the program to receive the proposal. Preliminary proposals must identify only a single PI and up to four co-PIs with those titles. Other major participants may be designated as "other senior personnel." Please see the NSF PAPPG for definitions of Senior Personnel.
- **Project Summary** (1-page maximum): Please follow guidance in the NSF PAPPG.
- **Project Description:** (limited to 15 pages total) In addition to the requirements specified in Chapter II.C.2 of the PAPPG, this section should discuss
 - the intellectual focus of the proposed institute; the rationale for the proposed institute, its mission and goals, and its expected impact; plans for future growth and resource development; proposed steps toward developing its role as a national institute of excellence. Describe the research projects the institute plans to focus on, together with justifications and a list of key researchers and the lead for each project;
 - a tentative schedule of scientific activities, with plans for Year 1 and a provisional schedule for Years 2 and 3. Plans should reflect a "ramp-up" period of up to two years, with a full complement of activities no later than the beginning of Year 3 of the award;
 - plans for human resource development, broadening participation, and the selection and involvement of researchers at all career levels;
 - plans for outreach and for dissemination of outcomes.

Note: Results from Prior NSF Support should not be included. Also, URLs may not be used.

- **References Cited:** Please follow guidance in the NSF PAPPG for instructions.
- **Biographical Sketches:** For all key personnel (PI, Co-PIs, senior personnel etc.), provide a brief biographical sketch, using the format specified in the NSF PAPPG.
- **Budget:** No budget is required for preliminary proposals.
- **Facilities, Equipment and Other Resources:** In order for NSF, the SF, and reviewers to assess the scope of a proposed project, all organizational resources necessary for, and available to a project, must be described in this section of the preliminary proposal. Proposers should describe only those resources that are directly applicable. The description should be narrative in nature and must not include any quantifiable financial information. Proposers should include a description of the internal and external resources (both physical and personnel, including any laboratories and/or computational facilities) that are expected to be available to the project. Such information must be provided in this section, in lieu of other parts of the preliminary proposal.
- **Supplementary Documentation:** Submit Supplementary Documents containing the following information:
 - **List of All Institute Personnel:** Provide name, email address, and organizational affiliation for PI, co-PI, and other senior personnel.
 - **Governance and Management:** The governance and management structure of the proposed institute; a management plan describing key leadership positions, reporting relationships, means of communication and interaction among the members of the group and with the community oversight and accountability mechanisms; mechanisms for focusing the proposed institute's activities; mechanisms for choosing programs, selecting participants, and allocating funds; mechanisms for recruitment, selection, and appointment involved in research group leaders and institute leadership succession and other leadership changes; and rationale for the proposed management practices. (This section is not to exceed 3 pages total.)
 - **Institutional Capabilities:** Describe how the current capabilities and resources of the lead and participating organizations will facilitate the proposed institute activities. Include information on organizational leadership, technical expertise, general support, and maintenance as well as space, infrastructure, and technologies for collaborations of mathematical scientists and biologists. (This section is not to exceed 3 pages total.)

Information pertaining to "Results from Prior NSF Support", "Current and Pending Support", "Data Management Plan", and "Postdoctoral Mentoring Plan" is not required for preliminary proposals and may not be included.

Information to be submitted to NSF via the FastLane Single Copy Documents Section: Collaborators & Other Affiliations (COA) information specified in the PAPPG should be submitted for all PI, Co-PIs, and Senior Personnel using the instructions and spreadsheet template found at <https://nsf.gov/bfa/dias/policy/coa.jsp>.

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

- 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 Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from 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: (https://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) 292-8134 or by e-mail from nsfpubs@nsf.gov.

See PAPPG Chapter II.C.2 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 PAPPG instructions.

Full proposals should only be submitted if invited by NSF and SF, following the outcome of the assessment of the preliminary proposals.

Separately submitted collaborative proposals will not be accepted. Funding to partner organizations must be through subawards. When preparing a full proposal for this competition, proposers are advised to review the Program Description and the Proposal Review Information found in this solicitation.

If invited by NSF and SF, **full proposals should provide much more detail than the preliminary proposal**. Project management descriptions should be clear and concise.

Every effort should be made to update information that was provided in the preliminary proposal and to fully address issues raised in the preliminary proposal review and the input provided by the cognizant program director.

Full proposals must conform to the NSF PAPPG requirements, with the following modifications:

- **Cover Sheet:** For planning purposes July 01, 2023 should be shown as the start date. During the full proposal submission stage, the proposing organization should identify in the block entitled, "Show Related Preliminary Proposal Number", the related preliminary proposal number assigned by NSF. Proposers are reminded to identify the program solicitation number, identify the Division of Mathematical Sciences as the organizational unit and the Mathematical Sciences Research Institutes as the program to receive the proposal. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- **Project Summary** (1-page maximum): Please follow guidance in the NSF PAPPG.
- **Project Description:** Up to 30 pages is allowed for the project description and this limitation will be strictly enforced. In addition to the requirements specified in Chapter II.C.2 of the PAPPG, the Project Description should
 - highlight the intellectual focus of the proposed institute; the rationale for the proposed institute, its mission and goals, and its expected impact; plans for future growth and resource development; proposed steps toward developing its role as a national institute of excellence. Describe in detail the research projects the institute plans to focus on, together with detailed justifications, a list of key personnel, and the lead for each project,
 - provide a tentative schedule of scientific activities, with plans for Year 1 and a provisional schedule for Years 2 and beyond. Plans should reflect a "ramp-up" period of up to two years, with a full complement of activities no later than the beginning of Year 3 of the award,
 - present plans for human resource development, broadening participation, including the selection and mentoring of student and postdoctoral participants, as appropriate, and the selection and involvement of researchers at all career levels,
 - outline plans for creating sustained and meaningful scientific community involvement and outreach to the general public as well as for dissemination of the outcomes.
- **Biographical Sketches:** For all key personnel (PI, Co-PIs, and Senior Personnel), provide a brief biographical sketch, using the format specified in the NSF PAPPG.
- **Budget (for NSF portion):** Provide a five-year budget for the proposed activity. The budget should reflect a ramp-up of the institute's activities during Years 1 and 2, with a full complement of activities implemented no later than the beginning of Year 3. The Budget Justification section should take whatever space is necessary to provide a breakdown of planned expenditures in composite budget categories such as Researchers and Participant Support Costs, including projected headcounts for participants. Submit a separate budget and budget justification for each participating organization in cases where a subaward exceeds \$100,000 per year.
- **Facilities, Equipment and Other Resources:** In order for NSF, the SF, and reviewers to assess the scope of a proposed project, all organizational resources necessary for, and available to a project, must be described in this section of the proposal. Proposers should describe only those resources that are directly applicable. The description should be narrative in nature and must not include any quantifiable financial information. Proposers should include a description of the internal and external resources (both physical and personnel, including any laboratories and/or computational facilities) that are expected to be available to the project. Such information must be provided in this section, in lieu of other parts of the proposal (e.g., Budget Justification, Project Description).
- **Supplementary Documentation:** Submit Supplementary Documents containing the following information:
 - **List of All Institute Personnel:** Provide name, email address, and organizational affiliation for PI, Co-PI, and other senior personnel.

- **Simons Foundation Budget:** Projects will be jointly funded with the Simons Foundation. Half the budget should be prepared by following the NSF PAPPG and submitted in the proposal to NSF as outlined in the instruction above. The other half of the budget must be prepared by following instructions from the Simons Foundation, included with the announcement of this funding opportunity at the Simons Foundation website (<https://www.simonsfoundation.org/mathematics-physical-sciences/funding/request-for-applications/>) and submitted as a Supplementary Document with the proposal to NSF. Note that the Simons Foundation has a specific indirect cost rate policy. Provide a five-year budget for the proposed activity. The budget should reflect a ramp-up of the institute's activities during Years 1 and 2, with a full complement of activities implemented no later than the beginning of Year 3. The Budget Justification section should take whatever space is necessary to provide a breakdown of planned expenditures in composite budget categories such as Researchers and Participant Support Costs, including projected headcounts for participants.
- **Governance and Management:** The governance and management structure of the proposed institute; a management plan describing key leadership positions, reporting relationships, means of communication and interaction among the members of the group and with the community, oversight and accountability mechanisms; mechanisms for focusing the proposed institute's activities; mechanisms for choosing programs, selecting participants, and allocating funds; mechanisms for recruitment, selection, and appointment involved in research group leaders and institute leadership succession and other leadership changes; and rationale for the proposed management practices. (This section is not to exceed 5 pages total.)
- **External Advisory Board:** The qualifications and composition of the members who will serve on the advisory board; the responsibilities of this group and plans for membership terms and succession. Note: The Institute proposal should not name specific individuals to the board at this stage. (This section is not to exceed 3 pages total.)
- **Institutional Capabilities:** Describe how the current capabilities and resources of the lead and participating organizations will facilitate the proposed institute activities. Include information on organizational leadership, technical expertise, general support, and maintenance as well as space, infrastructure, and technologies for collaborations of mathematical scientists and biologists. (This section is not to exceed 5 pages total.)
- **Broadening Participation:** A plan reflecting the proposed institute's approach to increasing diversity, equity, inclusion, and accessibility and encouraging involvement of underrepresented groups at all levels of Institute activities including leadership, research, education, outreach and visitor programs; a description of how this plan will be implemented; and an outline of how its outcomes will be measured. (This section is not to exceed 5 pages total.)
- **Evaluation Plan:** Measures to evaluate progress toward the proposed institute's goals; and a plan to assess the effectiveness and impact of the proposed institute's activities. (This section is not to exceed 2 pages total.)
- **Data Management Plan:** Provide a description of how data, software, code bases, models, or other resources will be made available to the community. The plan should include a description of the efforts to enhance data sharing and standardization, as applicable, to enable broad access to research outcomes. (This section is limited to 2 pages)
- **Postdoctoral Mentoring Plan**, as appropriate: See the NSF PAPPG for instructions.
- **Information to be submitted to NSF as Single Copy Documents**
 - **Required:** Collaborators & Other Affiliations (COA) information specified in the PAPPG should be submitted using the instructions and spreadsheet template found at <https://nsf.gov/bfa/dias/policy/coa.jsp>
 - **Optional:** List of suggested reviewers or reviewers not to include; Proprietary or privileged information (if applicable).

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Indirect Cost (F&A) Limitations:

Projects will be jointly funded with the Simons Foundation. Half the budget must be prepared by following the NSF Proposal and Award Policies and Procedures Guide (PAPPG), and the other half of the budget must be prepared by following instructions from the Simons Foundation, included with the announcement of this funding opportunity at the Simons Foundation website (<https://www.simonsfoundation.org/mathematics-physical-sciences/funding/request-for-applications/>). Note that the Simons Foundation has a specific indirect cost rate policy.

Budget Preparation Instructions:

Provide a five-year budget for the proposed activity. The budget should reflect a ramp-up of the institute's activities during Years 1 and 2, with a full complement of activities implemented no later than the beginning of Year 3. Based on prior experience, a ramp-up schedule of 60%-75% of full funding in Year 1, and 75%-90% of full funding in Year 2, with full funding at \$10,000,000 from combined NSF and the Simons Foundation sources in Years 3-5, has led to successful scale up of institute-scale activities. The Budget Justification section should take whatever space is necessary to provide a breakdown of planned expenditures in composite budget categories such as Researchers and Participant Support Costs, including projected headcounts for participants.

C. Due Dates

- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. submitter's local time):
 December 01, 2021
- **Full Proposal Target Date(s):**
 July 18, 2022

Full Proposal Submission Target Date: July 18, 2022. Full proposal submission will be by invitation only from NSF and SF, based on the review of the preliminary proposals.

D. FastLane/Grants.gov Requirements

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 NSF Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The NSF Help Desk answers general technical questions related to the use of the FastLane and Research.gov systems. 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: <https://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. 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 may use Research.gov 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

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 PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://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 *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. 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

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. (PAPPG 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 PAPPG 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 other underrepresented groups 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 addition to the above criteria, the following will be used in the evaluation process of both the preliminary and invited full proposals:

Scope and Significance

- The scope and significance of the stated mission and goals of the institute;
- The quality and mutual cohesiveness of the core research groups that will comprise the institute;
- The impact of the proposed scientific activities on the mathematical and biological sciences;
- The extent of demonstrated institutional commitments.

Leadership, Governance, and Oversight

- The capabilities of the institute leadership, including management and organizational ability of the proposed director(s) to successfully integrate mathematical scientists and biologists into integrated and productive teams, and the commitment of the proposed leadership team;
- The potential of the institute's leadership and advisory teams to identify and engage with scientific challenges at the interface of mathematical and biological sciences;
- The design, structure, and management of the operation of the institute, that ensures the creation of an inclusive institute led by and with participation by diverse researchers, and that includes the quality and effectiveness of the management plan (including plans for interaction among the institute staff);
- Quality of plans for recruitment for advisory committees, project leads, program organizers, and participants.

Workforce Development, Dissemination, and Outreach

- The quality and appropriateness of the institute's training activities, especially plans to attract, involve, and mentor diverse graduate students and early-career researchers;
- The institutional commitment to promoting diversity, equity, inclusion, and accessibility, and the quality of the institute's plan to broaden participation in mathematical and biological sciences research;
- The effectiveness of plans for dissemination of outcomes, for support of remote participation in institute activities, where appropriate, and for outreach to the general public, if appropriate.

B. Review and Selection Process

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

The program will be managed by program directors from NSF and the Simons Foundation. NSF will take the lead in managing, organizing, and conducting the review process of all proposals. The Simons Foundation program directors will make recommendations for reviewers and will attend NSF review panels as observers. Copies of proposals and unattributed reviews will be shared with the Simons Foundation, as appropriate, through a confidential secure file transfer system.

SF will review all Recommended for Funding Proposals in accordance with its policies and procedures and applicable legal requirements, including those applicable to private foundations. NSF and SF program directors will discuss the results of NSF's and SF's reviews of Recommended for Funding Proposals to reach concurrence in funding recommendations.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF Process: After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

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 https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from 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 *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Special Award Conditions:

The proposal selected for funding will be subject to each Foundation's respective award policies and practices. The Institute funded by this program will receive two separate awards of equal size in terms of total costs, one from NSF and one from the SF. For NSF, standard NSF award conditions will apply. SF awards will use standard SF award terms, conditions and reporting requirements. Award notification and administration will be carried out by NSF with respect to each of its awards, in consultation with SF. Award notification and administration will be carried out by SF in consultation with NSF. NSF and SF may conduct annual site visits to provide appropriate oversight of the Institute.

The institute leadership team, including the Director (who should serve as the Principal Investigator of the proposal) and other principal researchers, will join annual meetings at the Simons Foundation in New York City.

C. Reporting Requirements

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 no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 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, 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 Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Additional Reporting Requirements:

Additional reporting requirements, including possible reverse-/site visits to enable the oversight of the Institute may be required as part of the award terms and conditions.

For the Simons Foundation award, reports shall be submitted in the form and in the manner set forth in the Simons Foundation grant agreement.

VIII. AGENCY CONTACTS

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:

- Zhilan J. Feng, National Science Foundation, telephone: (703) 292-7523, email: NITMB@nsf.gov
- Jaroslaw Majewski, National Science Foundation, telephone: (703) 292-7278, email: NITMB@nsf.gov
- Sridhar Raghavachari, National Science Foundation, telephone: (703) 292-4845, email: NITMB@nsf.gov
- Elizabeth Roy, Simons Foundation, telephone: (212) 524-6966, email: eroy@simonsfoundation.org
- Samuel M. Scheiner, National Science Foundation, telephone: (703) 292-7175, email: NITMB@nsf.gov
- Junping Wang, National Science Foundation, telephone: (703) 292-4488, email: NITMB@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
- FastLane Help Desk e-mail: fastlane@nsf.gov.
- Research.gov Help Desk e-mail: rgov@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.

Important Note: For timely responses to your questions, please direct your email messages to the Program Directors on the NSF-Simons NITMB Working Group at NITMB@nsf.gov

IX. OTHER INFORMATION

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](#).

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 <https://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

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 (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

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