



**Directorate for Mathematical and Physical Sciences (MPS) Advisory Committee Meeting
November 8-9, 2023
National Science Foundation
Hybrid Meeting**

AC Summary Minutes

Day 1, Wednesday, November 8, 2023

MPSAC Attendees:

Dr. Anna Balazs	Dr. Cornelia Lang
Dr. Tabbetha Dobbins	Dr. Jennifer Lewis
Dr. Miguel Garcia-Garibay	Dr. Jill Pipher
Dr. Catherine Hunt	Dr. Ed Thomas, Jr.
Dr. Dan Jaffe	Dr. William Tolman
Dr. Eva Halkiadakis	Dr. Roldolfo Torres
Dr. Yuri Tshinkel	Dr. Suzanne Weekes

Public Section Begins

1.1

10:00 AM – 10:05AM

Call to Order and Official Opening of the Meeting

AC: Dr. Cornelia C. Lang, MPSAC Chair, University of Iowa

Immediately prior to the meeting being called to order, Dr. Cornelia Lang asked for introductions around the room. Dr. Catalina Achim briefed members on the policies of the Federal Advisory Committee Act regarding conflicts of interest for AC members, as well as a reminder that the meeting was open to the public and occurring under the guidelines of FACA. The meeting was officially opened at 10:00 am by Dr. Cornelia Lang. The minutes from the previous meeting, held in Spring 2023, were unanimously approved by a motion introduced by Dr. Lang.

1.2

10:05 AM – 10:35 AM

MPS Update from the Assistant Director

NSF: Dr. Denise Caldwell, MPS Assistant Director

Dr. Denise Caldwell, Acting Assistant Director for the Mathematical and Physical Sciences, provided an update on the state of the Directorate. Dr. Caldwell's remarks included the following topics:

- MPS organizational changes.
- MPS support for 2023 Nobel Prize awardees.
- Overview of new MPS centers.
- MPS programmatic updates.
- Recent progress in artificial intelligence and quantum information science.
- Overview of broadening participation efforts in MPS.
- Astro2020 and major facilities update.

1.3

10:35 AM – 10:55 AM **Science Highlight – NANOGrav, PHY**

NSF: Dr. Jeanne Cottam Allen, PHY Acting Division Director

NSF: Dr. Pedro Maronetti, PHY Program Director

Dr. Pedro Maronetti discussed some recent work from the North American Nanohertz Observatory for Gravitational Waves (NANOGrav), an international collaboration dedicated to exploring the low-frequency gravitational wave universe through radio pulsar timing. The team conducted an analysis of millisecond pulsars, which rotate hundreds of times per second and emit radio pulses like ticks from highly accurate cosmic clocks. They discovered what appeared to be variations in the "ticking rate" of such pulsars by comparing observations of more than 60 pulsars within radio telescope data spanning 15 years. Their



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analysis provides evidence that the variations are caused by low-frequency gravitational waves which are distorting the fabric of physical reality known as spacetime.

1.4

11:15 AM – 12:15 PM **AST COV Report presentation and approval**

AC Chair of AST Committee of Visitors: Alyssa Goodman

AC liaison: Dr. Miguel Garcia Garibay, University of California Los Angeles

Dr. Alyssa Goodman reviewed the AST Committee of Visitors (COV) charge and provided a summary of the COV findings. She noted that in addition to the core COV questions, the COV prioritized five issues:

1. Clarifying the meaning of “Broader Impacts” for both proposers and reviewers.
2. Strategizing with PIs about how co-funding with other NSF divisions/directorates and/or with other agencies and foundations might help them fund their research.
3. Making more sophisticated use of automated literature analysis tools to identify the most relevant reviewers while also reducing unnecessary conflicts of interest.
4. Making use of astronomy’s lead in data sharing and open-source code development in (commercial) technology development.
5. Emphasizing and restructuring communication with the public.

After her presentation, Dr. Goodman opened up the floor to questions. The report was unanimously approved by a motion introduced by Dr. Lang.

1.5

1:40 PM – 2:25 PM

Subcommittee on Facilities and Major Research Infrastructure 2nd Interim Report Presentation and Approval

AC: Dr. Jill Pipher, co-chair of the AC Subcommittee for Facilities, Brown University

Dr. Roger Falcone, co-chair of the AC Subcommittee for Facilities, UC Berkeley

Dr. Pipher gave an update on the draft 2nd interim report of the subcommittee on facilities and major research infrastructure. The subcommittee was charged with providing MPS a set of considerations for prioritization of major facility projects across the competing needs of the communities served by the Directorate.

Dr. Pipher noted that NSF currently faces an unprecedented challenge in setting priorities and managing construction and operations costs, given the magnitude and number of requests from the scientific community.

The draft recommendations for the prioritization of major facilities fall into three categories:

- Scientific and Technical Need and Impact
- Readiness to Proceed
- Alignment with Broader Missions

The draft report includes the following suggestions:

- MPS should maintain an actively managed portfolio of projects that are reviewed as a group.
- Prioritization should occur within Divisions and across Divisions.
- All three prioritization categories are essential, but there is a tiered ordering.
- Ensure community participation and endorsement by making all stages of the process open and transparent.



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2:25 PM – 2:45 PM

Update on the Next-Generation Gravitational Wave Observatory (ngGW) Subcommittee

Dr. Vicky Kalogera, Chair of the AC NextGenGW SC, Northwestern University

Dr. Kalogera discussed the progress made within the ngGW subcommittee since its formation in January of 2023. The subcommittee was charged with:

- An overview of the potential astrophysical scientific outcomes of the next generation of the U.S. GW detection network.
- A survey of the highest priority detector concepts that could be nodes of the GW detection network.
- A recommended list of GW detection network configurations.

The ngGW subcommittee received white papers in June 2023, and invited oral presentations on the current status and near-term expectations for operating or funded detectors: LIGO, Virgo, LIGO-India, KAGRA, Einstein Telescope, LISA.

The subcommittee is reviewing all materials in addition to requesting calculations for additional potential networks by the Cosmic Explorer team. Some of the next steps include:

- assess technical risks needed to achieve 10x sensitivity
- consider potential technology steps along the path
- consider funding scenarios.

The subcommittee is in the early stages of developing a report that is expected to be ready for MPSAC in late January/early February.

1.6

3:00 PM – 3:45 PM

TIP Update

NSF: Dr. Erwin Gianchandani, Assistant Director for TIP Directorate

Dr. Denise Caldwell, Acting Assistant Director for MPS, and Dr. Erwin Gianchandani, Assistant Director for TIP, engaged in a fireside chat with the MPS Advisory Committee. The discussion topics focused on recent activities within the TIP Directorate and the opportunities for collaboration between TIP and MPS.

1.8

3:45 PM – 4:15 PM

Waterman Award Debrief

NSF: Dr. Alicia J. Knoedler, the Head of the Office of Integrative Activities (OIA),

NSF: Dr. Steve Meacham, the Section Head for the Integrative Activities section of the Office of Integrative Activities (OIA).

Dr. Alicia J. Knoedler, the Head of the Office of Integrative Activities (OIA), and Dr. Steve Meacham, the Section Head for Integrative Activities in OIA, provided an update on the NSF Waterman Award competition. MPS AC member Bill Tolman provided an update on the work of the Waterman Award



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Canvassing Working Group of the MPS Advisory Committee.

4:15 PM – 5:00 PM Preparation for discussion with NSF Director, Chief Operation Officer (COO), and Chief of Staff (COS)

MPS AC Chair Dr. Cornelia Lang led a discussion with the MPS AC members on potential topics to be discussed during the session with the NSF Director, COO, and COS. Topics discussed included:

- Highlights from the second facilities report.
- The TIP directorate and its connections to MPS.
- The engagement of MPS with agency wide initiatives.
- MPS COV report highlights and some common themes.

5:00 PM – 5:15 PM Closing Remarks and Adjourn for the Day

At 5:06 pm MPS AC Chair Dr. Cornelia Lang thanked the AC members and NSF for a wonderful first day and adjourned for the day.

Day 2, Thursday, Apr. 20, 2023

MPSAC Attendees:

Dr. Anna Balazs	Dr. Cornelia Lang
Dr. Tabbetha Dobbins	Dr. Jennifer Lewis
Dr. Miguel Garcia-Garibay	Dr. Jill Pipher
Dr. Catherine Hunt	Dr. Ed Thomas, Jr.
Dr. Dan Jaffe	Dr. William Tolman
Dr. Eva Halkiadakis	Dr. Suzanne Weekes
Dr. Yuri Tshinkel	

Public Section Begin

2.1

8:55 AM – 9:00 AM Welcome and Overview of Agenda
AC: Dr. Cornelia C. Lang, MPSAC Chair, University of Iowa

The meeting was opened at 8:57 am by Dr. Cornelia Lang and began with a reminder from Dr. Catalina Achim on the policies of the Federal Advisory Committee Act from the previous day's briefing. Dr. Lang then provided an overview of the day 2 agenda.

2.2

9:00 AM – 9:45 AM Update on NSF programs and new initiatives related to diversity, equity, inclusion, and accessibility (DEIA)
NSF: Dr. Charles Barber, NSF Chief Diversity and Inclusion Officer

Dr. Charles Barber provided an overview of the NSF Diversity, Equity, Inclusion, and Accessibility (DEIA) program. He discussed the program's framework, gave an update on some recent legislation related to DEIA, and described the NSF DEIA Maturity Model.



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10:00 AM – 11:00 AM **Division of Materials Research (DMR) Committee of Visitors: Report presentation and approval.**

DMR COV Co-Chair Dr. Kathryn Moler, Stanford University
AC liaison: Dr. Dan Jaffe, University of Texas at Austin

Dr. Kathryn Moler gave an overview of the work of the DMR Committee of Visitors (COV). She discussed the topical landscape of the DMR portfolio and highlighted some of its notable outcomes and impacts. She then discussed the recommendations of the Committee of Visitors (COV) report and opened up the floor to questions. The COV report was unanimously approved by a motion introduced by Dr. Lang.

2.4

11:00 AM – 12:00 PM **MPSAC Engagement Request**
Dr. Denise Caldwell, MPS Assistant Director

The dialogue between Dr. Denise Caldwell and the MPS AC members focused on the ways that MPS could improve its programs by capitalizing on NSF-wide funding opportunities. This session was framed around the following questions:

- I. What are examples of successful engagement of the MPS community in NSF-wide funding opportunities?
- II. What are the challenges that should be addressed to increase the ability of researchers to participate in NSF-wide opportunities?
- III. How can MPS be more effective in communicating with the community about NSF opportunities?
- IV. Are you aware that one can tailor the content of notices from NSF at <https://public.govdelivery.com/accounts/USNSF/subscriber/topics> ?

2.5

1:30 PM - 2:00 PM **Preparation for Meeting with NSF Director, Chief Operating Officer, and Chief of Staff**

The MPS AC members reviewed their questions and discussion topics in preparation for meeting with the NSF Director, Chief Operating Officer, and Chief of Staff.

2:00 PM – 2:30 PM **Discussion with NSF Director, COO and Chief of Staff**
NSF Director, Dr. Sethuraman Panchanathan
Chief Operating Officer, Dr. Karen Marrongelle
Chief of Staff, Dr. Brian Stone

MPS AC Chair Cornelia Lang introduced AC members to the COO, and Chief of Staff and shared some highlights from the two days of the AC meeting.

Dr Lang closed the session with a farewell acknowledgement to the MPS AC members who are completing their terms prior to the next meeting: Dr. David Ashalom, Dr. Jennifer Lewis, Dr. Miguel Garcia-Garibay, and Dr. Katie Hunt.



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Closing Remarks

AC: Dr. Cornelia C. Lang, MPSAC Chair

NSF: Dr. Denise Caldwell, Acting Assistant Director for MPS

At 2:35 pm MPS AC Chair Cornelia Lang brought the AC meeting to a close by thanking everyone for joining. She announced the next AC dates of March 26-27, 2024. Dr. Caldwell added her thanks on behalf of NSF.