

# SPACE SCIENCE WEEK

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## SPACE SCIENCE WEEK

### SPRING 2018 MEETING OF THE COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE

March 27-29, 2018

NAS Building – 2101 Constitution Ave NW – Washington D.C

#### OPEN SESSION DRAFT AGENDA

**Tuesday March 27, 2018**

#### MORNING PARALLEL BREAK-OUT SESSION

**COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE (CBPSS) – Room XX**

**7:30 AM**      *Registration Opens and Working Breakfast is Available in the Great Hall*

#### OPEN SESSION

<b>9:00 AM</b>	<b>Welcome and Introductions</b>	<b>Rob Ferl and Elizabeth Cantwell, Co-Chairs</b>
<b>9:15 AM</b>	<b>SLPSRA Program Status</b> <ul style="list-style-type: none"><li>• Midterm Report</li><li>• Implications of ISS Budget Plans</li><li>• Status of SLPSRA role in DSG</li><li>• SLPSRA organizational status and plans</li></ul>	<b>Craig Kundrot, NASA</b>
<b>10:15 AM</b>	<b>Discussion: ASGSR and the Next Decadal Survey</b>	<b>Anna-Lisa Paul, ASGSR</b>
<b>11:00 AM</b>	<i>Break Available Outside Room</i>	

#### EXECUTIVE SESSION

<b>11:15 AM to 12:00 PM</b>	<b>Committee Discussion</b>
<b>12:00 PM</b>	<i>Lunch available in the Great Hall</i>

#### PLENARY SESSION Kavli Auditorium

#### Opening Session

<b>1:00 PM</b>	<b>Welcome</b>	<b>Fiona Harrison, SSB Chair</b>
<b>1:05 PM</b>	<b>Quick Update on Current SSB Activities</b>	<b>Dick Rowberg, Interim SSB Director</b>

#### Focus Session on NASA Science Program

<b>1:15 PM</b>	<b>NASA-SMD Budget, Program, and Priorities</b> <i>Presentation 20 mins / Q&amp;A 25 mins</i>	<b>Thomas Zurbuchen, NASA</b>
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Last Updated 3.9.18 11:00 AM

### Focus Session on International Collaboration – Program Briefs

- 2:00 PM**      **Short 15-minute Talks From Agency Representatives**
- ESA Space Science – Fabio Favata, ESA-SCI
  - ESA Human and Robotic Exploration – David Parker, ESA-HRE
  - ESA Earth Observation Programs - Status and Future Challenges – Maurice Borgeaud, ESA-EO
  - Chinese Academy of Sciences: Current and Future Programs – Ji Wu, CAS National Space Science Center
  - JAXA Institute of Space and Astronautical Science – TBC, JAXA-ISAS
- 3:15 PM**      *Break Available in the Great Hall*

### Focus Session on International Programs – Discussion on Collaboration

- 3:45 PM**      **Personal Perspective on State of International Collaboration: Len Fisk, President of COSPAR**
- 4:00 PM**      **Moderated Q&A Sessions with NASA, COSPAR and International Agency Representatives**  
**Moderator: Fiona Harrison, SSB Chair**
- 5:30 PM**      **Closing Comments: SSB Chair**
- Public Meeting Adjourns*

### Annual Space Science Week Reception and Dinner — By Invitation Only

*(Committee Members, Plenary Speakers, and Guests by Invitation Only)*

- 6:00 PM**      *Reception in West Court*
- 7:00-8:30 PM**      *Dinner in the NAS Great Hall*

**Wednesday March 28, 2018**

### COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE (CBPSS) – Room XXX

- 7:30 AM**      *Registration Opens and Working Breakfast is Available in the Great Hall*

### OPEN SESSION

### Symposium: Space Life and Physical Sciences Research Supporting Moon and Mars Missions

- 9:00 AM**      **Welcome and Introductions**      **Robert Ferl and Elizabeth Cantwell, Co-Chairs**

### Session 1: Symposium: Human Health Is Pivotal for the Mission to Mars

- 9:15 AM**      **Integrated Resistance and Aerobic Exercise Training Protects Against Multi-System Deconditioning: Results from the NASA 70 Day Bed Rest Study**      **Jessica M. Scott**  
**Memorial Sloan Kettering Cancer Center, New York City**
- 9:45 AM**      **The Promise of Genomics and Epigenetics Studies in NASA Exercise Research**      **Schlomit Radom-Aizik**  
**Director, UC Irvine Health Pediatric Exercise and Genomics Research Center (PERC), School of Medicine, University of California, Irvine**

<b>10:15 AM</b>	<i>Break Available Outside Room</i>	
<b>10:30 AM</b>	<b>The Role of Artificial Gravity for Maintaining Human Health on Both the Moon and Mars</b>	<b>Vincent Caiozzo</b> Department of Orthopedics and Physiology and Biophysics, University of California
<b>11:00 AM</b>	<b><i>Exercise is Medicine</i> is Pivotal for Humans to Go to Mars and Return to Mother Earth</b>	<b>Scott Trappe</b> Professor of Exercise Sciences and Director of the Human Performance Laboratory, Ball State University
<b>11:30 AM</b>	<b>Additional Q&amp;A</b> Moderator: Ken Baldwin, University of California, Irvine	
<b>12:00 PM</b>	<b>General Discussion</b> <i>Working Lunch Available in the Great Hall</i>	

## Session 2: Physical Processes and Technology for Exploration

<b>1:30 PM</b>	<b>Plans and Design Challenges for Nuclear Thermal Propulsion Systems Supporting Deep Space Transportation</b>	<b>Ronald J. Litchford, Principal Technologist for Propulsion, Space Technology Mission Directorate, NASA</b>
<b>2:05 PM</b>	<b>Plans and Design Issues for Nuclear Power Systems Supporting Human Missions to Planetary Surfaces</b>	<b>Patrick Ray McClure, Kilopower Project Lead, Los Alamos National Laboratory</b>
<b>2:40 PM</b>	<i>Break Available Outside Room</i>	
<b>3:10 PM</b>	<b>Reduced Gravity and Environmental Issues in the Design and Operation of In-Situ Resource Utilization Systems for Human Missions</b>	<b>Gerald (Jerry) Sanders, Lead for ISRU System Capability Leadership Team, Human Exploration and Operations Mission Directorate, NASA</b>
<b>3:45 PM</b>	<b>ISRU Construction and Excavation of Regolith</b>	<b>Robert Mueller, Senior Technologist, Science and Technology Projects Division, NASA KSC</b>
<b>4:20 PM</b>	<b>Additional Q&amp;A</b> Moderator: Betsy Cantwell, Arizona State University	
<b>5:15 PM</b>	<i>Symposium Adjourns</i>	
<b>5:30 PM</b>	<b><i>(Committee Members, Plenary Speakers, and Guests by Invitation Only)</i></b> <i>Buffet Working Dinner in the West Court</i>	

## Public Lecture – Kavli Auditorium

<b>7:00 PM</b>	<b>The Gravitational Wave Astronomical Revolution</b> Dr. David Reitze, Executive Director of the LIGO Project, CalTech
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**Thursday March 29, 2018**

**COMMITTEE ON BIOLOGICAL AND PHYSICAL SCIENCES IN SPACE (CBPSS) – Room XX**

**EXECUTIVE SESSION**

**9:00 AM to 12:00 PM**

**Committee Discussion**

## GENERAL NOTES

**Pre-registration:** All participants, including committee members, invited speakers and other attendees, are strongly encouraged to preregister at <http://www.surveymoz.com/s3/4142600/07f04547401e>).

**Registration** will be located in the Great Hall during the event. Please check-in there to receive your badge.

**NAS Building:** Is located at 2101 Constitution Ave., NW, between the State Department and the Vietnam Veterans Memorial. Additional information about the NAS Building is available at <http://www.nationalacademies.org/about/contact/nax.html>.

**Wi-Fi Connection:** To connect to the Wi-Fi choose “Visitor Network” then open up a browser and click “Accept terms and conditions.” You will then be connected to the internet.

**Metro:** The closest Metro station (0.5 miles) is Foggy Bottom (Blue and Orange lines; exit and turn right, then turn left once you have passed the State Department)—see <https://www.wmata.com/rider-guide/stations/foggy-bottom.cfm>.

**Parking:** Very limited parking is available onsite at the NAS. The 22 available parking spaces are first come first served. Other available parking options are as follows:

- Columbia Plaza –23<sup>rd</sup> and Virginia Avenue NW.
- Colonial Parking – 20<sup>th</sup> Street, NW, between E and F Streets.

**Space Science Week Website:** [http://sites.nationalacademies.org/SSB/SSB\\_182835](http://sites.nationalacademies.org/SSB/SSB_182835)

The following information is provided for any members of the general public who may be in attendance:

This meeting is being held to gather information to help the committee in its charge. This committee will examine the information and material obtained during this, and other public meetings, in an effort to inform its work. Although opinions may be stated and lively discussion may ensue, no conclusions are being drawn nor will recommendations be made. Observers who draw conclusions about the committee’s work based on this meeting’s discussions will be doing so prematurely.

Furthermore, individual committee members often engage in discussion and questioning for the specific purpose of probing an issue and sharpening an argument. The comments of any given committee member may not necessarily reflect the position he or she may actually hold on the subject under discussion, to say nothing of that person’s future position as it may evolve in the course of the project. Any inference about an individual’s position are therefore also premature.

### RECORDING OF THE MEETING

This meeting will be recorded by the NRC. Please be aware that by attending the meeting, you consent to your voice being recorded for use by the NRC for the purpose of note-taking. This recording will not be publicly released, shared outside of the NRC, or used for other public purposes.

## NOTES FOR PRESENTERS

If your presentation contains unpublished data, ITAR controlled and/or other sensitive information, please be aware that the open sessions at the meeting may be recorded and/or webcast. Presentation materials given to the committee may be posted on a publicly accessible website. Please edit your presentations accordingly.

Mac users should assume that their presentation will be displayed via one of the NRC’s PCs. If your presentation is graphics heavy and best displayed via your own laptop, you should also bring a plain-vanilla pdf version of your presentation with you. The audience in the meeting room will see your presentation via your laptop and we will webcast the pdf file.

At some point a staff member will be asking you to sign a consent form allowing us to use your presentation, specifically to post it on our website.

## REMOTE CONNECTION DETAILS

**Zoom Instructions:**