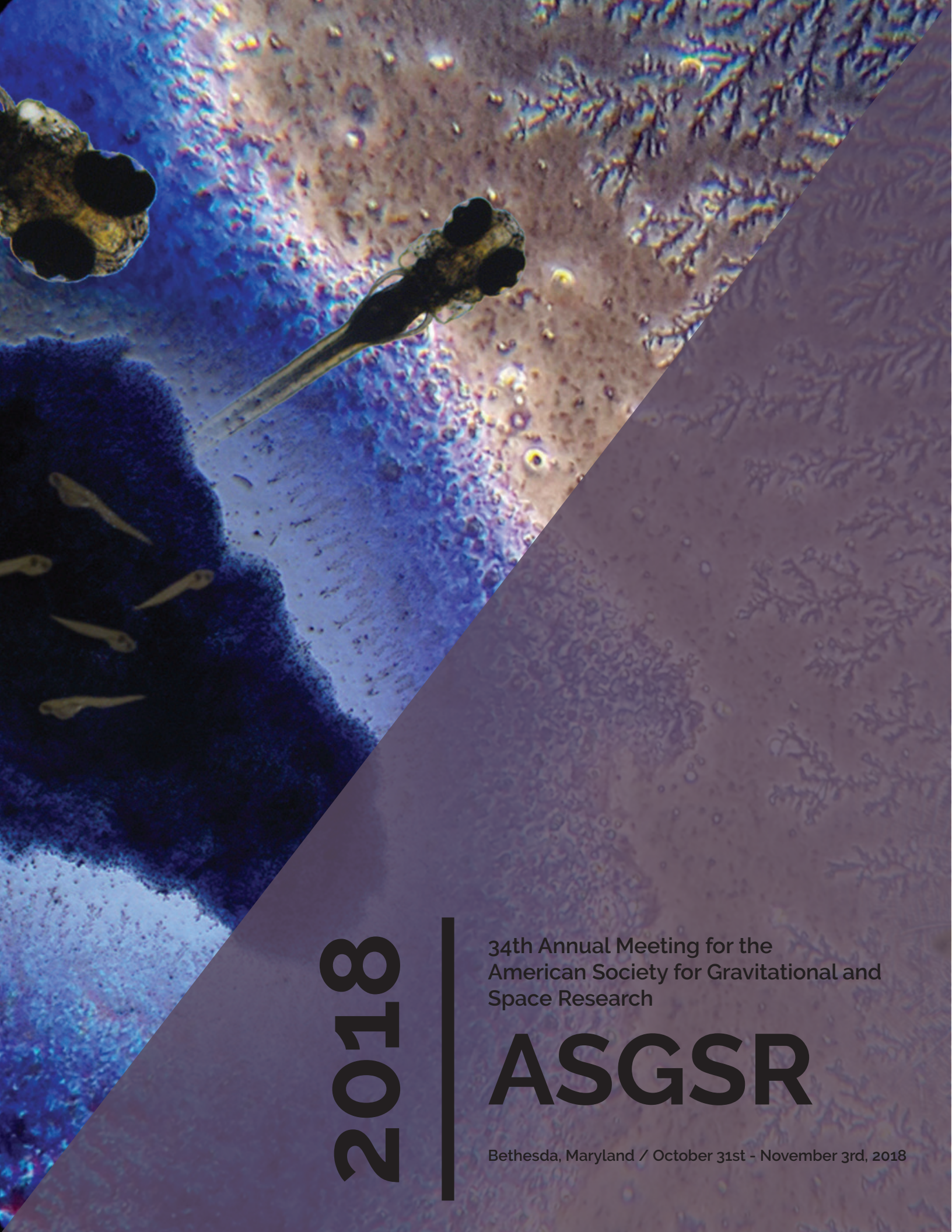

2018

34th Annual Meeting for the American Society for Gravitational and Space Research

ASGSR

Bethesda, Maryland / October 31st - November 3rd, 2018

Notes

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A Letter from Program Chair, David Urban

Dear Colleagues,

On behalf of the ASGSR President, Dr. Anna-Lisa Paul, and the Organizing Committee, we welcome you to the 34th Annual Meeting of the American Society for Gravitational and Space Research (ASGSR) October 31- November 3, 2018 at the Bethesda North Marriott and Conference Center, Bethesda, Maryland.

We hope you find this meeting program informative and varied, combining scientific, technical, policy, and educational activities. Our program comprises a broad range of symposia and workshops covering research results in space and gravitational life and physical sciences.

This year's plenary sessions on October 31, 2018 will start with opening remarks by Dr. Anna-Lisa Paul followed by a life and physical sciences joint symposium. The sessions then capture the Washington area location of this year's meeting by US policy presentations from representatives "inside the beltway." It begins with a talk from a representative from the National Space Council, followed by White House and Hill perspectives. We are also featuring gravitational research perspectives from other government agencies. And during the lunch break on October 31, we are presenting Exploration Research 101 which will discuss the how, what, and why of microgravity and gravitational space research. Grab a box lunch and join us for that informative event.

In addition to the Plenary Symposia, there are symposia devoted to Hot Topics, Radiation, In-situ Resource Utilization, Technology and more. There will be a pre-conference workshop on October 30, 2018 with the National Institutes of Health.

The program includes topical platform paper sessions, poster sessions, the annual student poster judging competition, and many occasions for informal interactions and discussion with new friends and old – all of whom share interests and passions in space, gravity and the life and physical sciences.

The ASGSR will conduct their annual business meetings, committee meetings, editorial get-togethers, and strategic planning sessions. And, of course we'll eat and drink together repeatedly, but no meal will be more enjoyable than the ASGSR Banquet on Saturday night, featuring awards and a featured guest speaker Dr. Ellen Stofan, Executive Director of the National Air and Space Museum and former NASA Chief Scientist.

We hope you enjoy the 2018 program, and look forward to seeing you.

Best wishes,

David Urban, Ph.D.
ASGSR 2018 Program Chair

Schedule-at-a-Glance

Tuesday	07:00	05:00	Registration	Lower Level Registration
Tuesday	08:00	05:30	NIH/SLPS Pre-Conference Workshop	White Flint Amphitheater
Tuesday	12:00	07:00	Posters/Exhibit Hall Setup	Salon A-D
Tuesday	07:00	09:30	ASGSR Board Meeting	Seneca Boardroom
Wednesday	07:00	08:00	Continental Breakfast/Posters and Exhibits All Day	Salon A-D
Wednesday	07:00	05:00	Registration	Lower Level Registration
Wednesday	08:00	09:00	Welcome, Opening Remarks, and Plenary Lecture	Salon E
Wednesday	09:00	10:30	Life and Physical Sciences Joint Symposium - President's Plenary Symposium	Salon E
Wednesday	11:00	12:00	Presidents Symposium: Human Health Countermeasures…	Salon E
Wednesday	12:15	01:45	Space Science 101	Salon E
Wednesday	12:30	01:30	Standing Committee Meetings: Journal	Seneca Boardroom
Wednesday	12:30	01:30	Standing Committee Meetings: Membership/Communications	Glen Echo
Wednesday	02:00	04:00	Symposium #2 Programmatic Updates	Salon E
Wednesday	04:30	06:00	Symposium #3: Developing Cross-Cutting Science…	Salon E
Wednesday	06:00	09:00	Investigator Poster Session	Salon A-D
Wednesday	06:00	09:00	Welcome Reception	Salon E
Thursday	07:00	08:00	Continental Breakfast/Posters and Exhibits All Day	Salon A-D
Thursday	07:00	05:00	Registration	Lower Level Registration
Thursday	08:00	10:30	Symposium #4: Hot Topics in Life and Physical Sciences	Salon E
Thursday	11:00	12:00	Concurrent Technical Sessions	Various Rooms
Thursday	12:30	01:30	Standing Committee Meetings: Education & Outreach	Seneca Boardroom
Thursday	02:00	04:00	Programmatic Update - Life Science	Salon E
Thursday	02:00	04:00	Programmatic Update - Physical Sciences	White Flint Amphitheater
Thursday	4:00	6:00	Concurrent Technical Sessions	Various Rooms
Thursday	06:00	09:00	Free Evening for Networking	On your own
Friday	07:00	08:00	Continental Breakfast/Posters and Exhibits All Day	Salon A-D
Friday	07:00	05:00	Registration	Lower Level Registration
Friday	08:00	10:00	Symposium #5: Biological Response to Deep Space Radiation	Salon E
Friday	10:00	10:30	Morning Break Service	Salon A-D
Friday	10:00	12:00	Undergraduate/Graduate Student Poster Session	Salon A-D
Friday	10:00	04:00	Genelab Work Session	Timberlawn
Friday	12:30	01:30	Standing Committee Meetings: External and Strategic Affairs	Seneca Boardroom
Friday	12:30	01:30	Standing Committee Meetings: Meetings and Workshops	Forest Glen
Friday	02:00	04:00	Concurrent Technical Sessions	Various Rooms
Friday	04:30	06:00	Concurrent Technical Sessions	Various Rooms
Friday	06:00	07:30	Students Free	On your own
Friday	06:00	09:00	Free Evening for Networking	On your own
Friday	07:30	09:30	Student Mixer	Brookside A&B
Saturday	07:00	08:00	Continental Breakfast/Posters and Exhibits 7a-12p	Salon A-D
Saturday	07:00	05:00	Registration	Lower Level Registration
Saturday	08:00	09:30	Concurrent Technical Sessions	Various Rooms
Saturday	09:30	12:00	Middle/High School Poster Session	Salon A-D
Saturday	10:00	10:30	Morning Break Service	Salon A-D
Saturday	10:00	04:00	Genelab Work Session	Timberlawn
Saturday	12:00	02:00	ASGSR Board Meeting	Seneca Boardroom
Saturday	02:00	03:30	Concurrent Technical Sessions	Various Rooms
Saturday	02:00	03:30	Blue / NanoRacks Commercial Research Session	Forest Glen
Saturday	02:00	03:30	High School Meeting PIs Event	Linden Oak
Saturday	04:00	05:30	Concurrent Technical Sessions	Various Rooms
Saturday	06:00	07:00	Cash Bar Open Before Banquet	Foyer A-D
Saturday	07:00	09:30	Awards Banquet and Keynote by Ellen Stofan	Salon DE

Thank you for your generous donation.

Dr. Thora W. Halstead
NASA Scientist
Educator
August 30, 1928 – March 9, 2016

Dr. Thora Waters Halstead was a 21st century woman born in the 20th century and became a role model for young professional women and men in the biological sciences.

Being born in 1928, she was a pioneer as a bacteriologist, virologist and microbiologist. She graduated from high school at the age of 15, and went on to earn her PhD in Microbiology. She led some of the early discoveries on the uses and production of penicillin which was discovered one month after she was born.

After graduating from Washington State University with a degree in Bacteriology and Public Health in 1950, she moved back to her home town, Chicago, where she was the Virologist-in-charge at the Hektoen Institute for Medical Research.

In 1957, after earning her Master's Degree and marrying Warren Halstead, she was hired as a Research Scientist at Fort Detrick, MD. In the 1960s, she founded and chaired the Biology Department at the newly accredited Okaloosa Walton Community College in Valpariso, FL. In 1968, she earned her PhD in Microbiology from the University of Maryland, College Park.

It was in 1974 that Thora began her twenty-year career with NASA when she was hired as the Manager of the Space Biology Program, Life and Biomedical Sciences and Applications Division.

She was NASA's representative for Space Biology in its dealings with foreign space agencies, other US government agencies, scientific societies and the biological scientific community.

She was a member of the Life Sciences Joint Working Groups with the space agencies of Canada, France, Germany, Japan and the European Space Agency and worked directly with the Israeli space Agency. The exchange among these international partners produced jointly sponsored ground based and flight experiments. Thora's work with the Russians in the 1980s laid the groundwork for joint experiments on the US Space Shuttle and Russian MIR.

In addition to her international work, she partnered with the National Institutes of Health (NIH), National Science Foundation (NSF), United States Department of Agriculture (USDA), Department of Defense (DOD) and Office of Naval Research (ONR) with respect to joint ground and/or flight research and coordinated science programs.

As manager of the Space Biology Program, she formulated the goals and objectives of NASA's space biology research and ensured the funding of scientifically meritorious research at three NASA centers: Ames Research Center, Johnson Space Center, Kennedy Space Center, and forty-one universities.

Throughout her career, her numerous experiments and published research articles (more than 40) focused on the study of how the cells of living organisms respond to a low-gravity environment.

One of her last significant achievements at NASA was serving as the Life Sciences Program Scientist for Spacelab J (Japan) launched in September 1992.

Among her accomplishments, she ensured that the rodent model for simulating certain aspects of spaceflight (similar to bedrest in humans) was developed over many objections. It is now being used worldwide.

She also oversaw the development of habitats for plants and animals—some of which have been upgraded and are now on the International Space Station.

Given her love of science, it was not surprising that Thora was a founding member and past president of the American Society for Gravitational and Space Biology (ASGSB), now known as ASGSR. The society honored Thora upon her 1994 retirement from NASA by creating the 'Thora W. Halstead Young Investigator Award'. This award, which is given annually, was established to honor a young scientist who exemplifies Thora's drive and enthusiasm for science, and who has made significant contributions to the field of space biology. The award was dedicated to Thora in recognition of the years she spent encouraging young scientists to enter Space Biology research. At the time of her death in March 2016, thirty-one awards had been presented and included the then current Division Director of NASA's Space Life and Physical Sciences Research and Applications Division, and many current leaders in Space Life and Physical Sciences both within NASA and academia.

After retiring from NASA, Thora continued to consult for the Biosciences in Space community.

Thora had a strong supportive partnership with her husband of sixty years, Warren Halstead. Together, they had two children, Douglas and Gail; and three grandchildren, Paul, Kathryn and Kimberlee.

Tuesday, October 30th, 2018

7:00 AM - 5:00 PM
Registration

Lower Level Registration

8:00 AM - 5:30 PM
NIH/NASA Pre-Conference Workshop

White Flint Amphitheater, Lower Level
NASA and the NIH conduct research on a diversity of scientific topics that are cross-cutting between these Agencies. With the expansion of research employing the International Space Station and other NASA facilities and capabilities, the scientific investigations being conducted by each of these Agencies are having direct benefits to advancing fundamental biology, human space exploration, biomedical research and development, and education. NASA and the NIH are bringing together their science communities for a one-day workshop to obtain community comments and ideas for identifying research collaborative concepts that will lead to scientific advancements for both Agencies. This workshop will involve presentations from NASA Headquarters Space Life and Physical Sciences Division, the NASA Space Biology Program, the NASA Human Research Program, and Institutes of the NIH, which include science program overviews and collaborations, scientific research (microbiome and omics/personalized medicine/systems biology), and NASA biospecimen and data sharing. Particular focus will be given to how an integrative approach to research may provide opportunities for cross-Agency collaborations to advance science and human health in space and on Earth. Short panel sessions for Q&A and discussions will follow the primary topical workshop sessions. A round table session will complete the workshop day, which will give attendees the opportunity to provide input and ideas for scientific collaborative concepts between the Agencies.

12:00 PM - 7:00 PM
Posters/Exhibit Hall Setup

Salon A-D

7:00 PM - 9:30 PM
ASGSR Board Meeting

Seneca Boardroom, Lower Level

Wednesday, October 31st, 2018

7:00 AM - 5:00 PM
Registration All Day

Lower Level Registration

7:00 AM - 8:00 AM
Continental Breakfast, Posters/Exhibit Hall All Day

Salon A-D, Upper Level

8:00 AM - 9:00 AM
Welcome, Opening Remarks, and Plenary Lecture

Salon E, Upper Level
"One, Two, Few, Many: What Kind of Physics Can We Study on the International Space Station?"
Plenary Lecture by Eric Cornell

9:00 AM - 10:30 AM
Presidents Symposium: Human Health Countermeasures for Long-term Spaceflight Environments

Salon E, Upper Level
- Chair: Anna-Lisa Paul
- Dr. Andrea M. HansonExploration Medical Capabilities (ExMC) SE&I Team ISS Exercise Countermeasure Ops Integration Lead
- Dr. Beth E. Lewandowski Bio Science and Technology (GRC)
- Dr. Theodore W. Hall University of Michigan

10:30 AM - 11:00 AM
Break

Salon A-D, Upper Level

11:00 AM - 12:00 PM
Symposium #1 New Directions for NASA Space Research

Salon E, Upper Level
- Moderated by Gale Allen
- Jared Stout Deputy exec secretary National Space council
- Mr. Steve Jurczyk NASA Associate Administrator

Wednesday, October 31st, 2018

12:00 PM - 2:00 PM
Lunch

On your own

12:15 PM - 1:45 PM
Space 101

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Salon E, Upper Level

12:30 PM - 1:30 PM
Standing Committee Meetings (Journal/ Communication)

Journal, **Seneca Boardroom, Lower Level**
Membership/Communications, **Glen Echo, Lower Level**

2:00 PM - 4:00 PM
Symposium #2: Micro-gravity Research and Public Policy

Salon E, Upper Level

- Moderated by Dan Dumbacher
- Sam Black, Program Examiner, Science and Space Branch, Office of Management and Budget
- Jim Green, NASA Chief Scientist
- Senate and House Perspectives

4:00 PM - 4:30 PM
Break

Salon A-D, Upper Level

4:30 PM - 6:00 PM
Symposium #3 Developing Cross-Cut-ting Science Partner-ships and Collabora-tions

Salon E, Upper Level

- Moderated by Craig Kundrot NASA SLPS
- Christopher Austin, M.D. – Director, National Center for Advancing Translational Sciences (NCATS), NIH
- James Reuter - Acting Associate Administrator (STMD)

6:00 PM - 9:00 PM
Investigator Poster Session

Salon A-D, Upper Level

6:00 PM - 9:00 PM
Welcome Reception

Salon A-D, Upper Level

Thursday, November 1st, 2018

7:00 AM - 5:00 PM **Registration All Day**	**Lower Level Registration**
7:00 AM - 8:00 AM **Continental Breakfast, Posters/Exhibit Hall All Day**	**Salon A-D, Upper Level**
8:00 AM - 10:30 AM **Symposium #4: Hot Topics in Life and Physical Sciencs**	**Salon E, Upper Level** • Moderated by Anna-Lisa Paul and David Urban • "The Coolest Spot in the Universe: Early data from the Cold Atom Lab". Dr. Robert J Thompson, JPL • "Plant Epigenetics – Adaptive strategies for non-terrestrial environments" Dr. Robert Ferl, University of Florida • "Measurements on the ISS to Inspire and Enable the Creation of Transformative Products" Dr. Matthew Lynch, Proctor and Gamble
10:30 AM - 11:00 AM **Break**	**Salon A-D, Upper Level**
11:00 AM - 12:00 PM **Concurrent Technical Sessions**	Combustion 1: Low-Temperature Combustion and Space Applications - **Forest Glen, Lower Level** Enabling Technologies - 1 - **Salon E, Upper Level** Fluid Physics 1 - Fluid Techniques **- Glen Echo, Lower Level** Microbes - 1 **- Linden Oak, Lower Level** Plants 1 - Plants on Earth **- White Flint Amphitheater, Lower Level**
12:00 PM - 2:00 PM **Lunch**	**On your own**
12:30 PM - 2:00 PM **Standing Committee Meeting (Education & Outreach)**	**Seneca Boardroom, Lower Level**

Thursday, November 1st, 2018

2:00 PM - 4:00 PM **Programmatic Update - Life Science**	**Salon E, Lower Level**
2:00 PM - 4:00 PM **Programmatic Session - Physical Sciences**	**White Flint Amphitheater, Lower Level**
4:00 PM - 4:30 PM **Break**	**Salon A-D, Upper Level**
4:00 PM - 6:00 PM **Concurrent Technical Sessions**	Cardiovascular: The effects of microgravity on the cardiovascular system - **Salon E, Upper Level** Combustion 2: Droplets - **Forest Glen, Lower Level** Education and Outreach - Inspiring on Earth and taking flight **- Linden Oak, Lower Level** Fluid Physics 2 - Fluid Management **- Glen Echo, Lower Level** Plants 2 - Plants Off Earth (I) **- White Flint Amphitheater, Lower Level**
6:00 PM - **Free Evening for Networking**	**On your own**

Friday, November 2nd, 2018

7:00 AM - 5:00 PM
Registration All Day

Lower Level Registration

7:00 AM - 8:00 AM
Continental Breakfast, Posters/Exhibit Hall All Day

Salon A-D, Upper Level

8:00 AM - 10:30 AM
Symposium #5: Biological Response to Deep Space Radiation

Salon E, Upper Level

- Moderated by Marianne Sowa, NASA ARC
- Space Radiation and Mitochondrial Signaling , Tom Hei, Columbia University Medical Center
- Twins and Telomeres – in Space!, Susan Bailey, Colorado State University
- Space exploration beyond low earth orbit, Evagelia Laiakis, Georgetown University
- Impact of radiation and weightlessness on bone health, Candice Tahimic, NASA Ames Research Center/KBR Wyle

10:30 AM - 11:00 AM
Morning Break Service

Salon A-D, Upper Level

10:00 AM - 12:00 PM
Undergraduate/ Graduate Student Poster Session

Salon A-D, Upper Level

10:00 AM - 4:00 PM
Genelab Work Session

Timberlawn, Lower Level

Interested in how gene expression changes during spaceflight?

Visit the GeneLab ASGSR working sessions to learn and explore the GeneLab Data System.

How are omics data organized in GeneLab? What types of metadata are available? How can I use NASA's GeneLab platform to navigate, share, and analyze omics data?

To answer these and other questions, NASA's GeneLab project is hosting two sessions at ASGSR on November 2-3, 2018 to help the Space Biology community understand the capabilities available within GeneLab. This will be an informal "office hours"style session from 10:00 AM – 4:00 PM both days, with GeneLab staff and interns on-hand to demonstrate the GeneLab Data System and answer any questions. Users should bring their own laptops.

Friday, November 2nd, 2018

12:00 PM - 2:00 PM **Lunch**	**On your own**
12:30 PM - 2:00 PM **Standing Committee Meetings (External and Strategic Affairs/ Meetings and Workshops)**	External and Strategic Affairs, **Seneca Boardroom, Lower Level** Meetings and Workshops, **Forest Glen, Lower Level**
2:00 PM - 4:00 PM **Concurrent Technical Sessions**	Combustion 3: Material Flammability **- Forest Glen, Lower Level** Complex Fluids - 1 **- Glen Echo, Lower Level** Enabling Technologies - 2 **- Salon E, Upper Level** Microbes - 2 **- Linden Oak, Lower Level** Musculoskeletal System I **- White Flint Amphitheater, Lower Level**
4:00 PM - 4:30 PM **Break**	**Salon A-D, Upper Level**
4:30 PM - 6:00 PM **Concurrent Technical Sessions**	Central Nervous System **- White Flint Amphitheater, Lower Level** Combustion 4: Gaseous Flames **- Forest Glen, Lower Level** Complex Fluids - 2 **- Glen Echo** Enabling Technologies -3 **- Salon E** Fundamental Physics and Quantum Applications **- Linden Oak**
6:00 PM - **Free Evening for Networking**	**On your own**
7:30 PM - 9:30 PM **Student Mixer**	**Brookside A&B, Lower Level**

Saturday, November 3rd, 2018

7:00 AM - 5:00 PM
Registration All Day

Salon A-D, Upper Level

7:00 AM - 8:00 AM
Continental Breakfast

Salon A-D, Upper Level

8:00 AM - 9:30 AM
Concurrent Technical Sessions

Fluid Physics 3 - Liquid Phase Change **- Glen Echo**
Microbes - 3 **- Salon E**
Plants 3 - Plants Off Earth (II) **- Linden Oak**
Reproduction and Human Factors **- White Flint Amphitheater**
Materials Science **- Forest Glen**

9:30 AM - 12:00 PM
Middle/High School Poster Session

Salon A-D

10:00 AM - 10:30 AM
Morning Break Service

Salon A-D

10:00 AM - 4:00 PM
Genelab Work Session

Timberlawn
Interested in how gene expression changes during spaceflight?

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How are omics data organized in GeneLab? What types of metadata are available? How can I use NASA's GeneLab platform to navigate, share, and analyze omics data?

To answer these and other questions, NASA's GeneLab project is hosting two sessions at ASGSR on November 2-3, 2018 to help the Space Biology community understand the capabilities available within GeneLab. This will be an informal "office hours"style session from 10:00 AM – 4:00 PM both days, with GeneLab staff and interns on-hand to demonstrate the GeneLab Data System and answer any questions. Users should bring their own laptops.

Saturday, November 3rd, 2018

12:00 PM - 2:00 PM **Lunch,** **ASGSR Board Meeting**	**Lunch on your own,** **Board meeting in Seneca Boardroom**
2:00 PM - 3:30 PM **Concurrent Technical Sessions**	Enabling Technologies - 4 **- Salon E** Immune: Alterations to the immune system and immunity during spaceflight or simulates spaceflight **- White Flint Amphitheater**
2:00 PM - 3:30 PM **Blue Origin/Nanoracks Commercial Research Session**	**Forest Glen** Commercial access to research opportunities is growing in suborbital space, LEO, and beyond. This special session, co-hosted by Blue Origin and NanoRacks, will highlight options available to labs, companies, and K-12 educators looking to get their payloads to space now and in the years ahead.
2:00 PM - 3:30 PM **High School Meet PIs Event**	**Linden Oak**
3:30 PM - 4:00 PM **Break**	**Salon A-D**
4:30 PM - 6:00 PM **Concurrent Technical Sessions**	Fluid Physics 4 - Fluid Mechanistics **- Glen Echo** Materials Science: Levitation **- Forest Glen** Microbes - 4 **- Brookside A&B** Musculoskeletal System II **- White Flint Amphitheater** Plants 4 - Eating Plants Off Earth **- Linden Oak**
6:00 PM - 7:00 PM **Cash Bar Open Before Banquet**	**Foyer A-D**
7:00 PM - 9:30 PM **Awards Banquet and Keynote by Ellen Stofan**	**Salon D-E** Join us for a night with Ellen Stofan: Looking back at Apollo - Looking forward to Mars

Combustion 1: Low-Temperature Combustion and Space Applications - **Forest Glen**

Co-chairs: Daniel Dietrich, NASA Glenn Research Center, Tanvir Farouk, University of South Carolina

- "Influence of Low- and High-Temperature Chemistry on Flame Propagation in Supercritical Fluids," Wenkai Liang, Princeton University
- "Premixed cool flames in the counterflow: structure, propagation, and bifurcations," Omar Yehia, Princeton University
- "Planned ISS Testing for Flame Design," Peter Sunderland, University of Maryland
- "Closing the Loop on Space Waste with OSCAR," Anne Meier, NASA

Enabling Technologies - 1 - **Salon E**

Chair: Bill McLamb, CASIS

- "Mice orbiting on orbit: What's in a habitat?" April Ronca, NASA Ames Research Center
- "Overview of the Life Sciences Glovebox (LSG) Facility, " Anne Garber, NASA MSFC
- "Launch of ERAU's Cell Research eXperiment In Microgravity (CRExIM) Aboard Blue Origin's New Shepard," Pedro Llanos, Embry-Riddle Aeronautical University
- "NASA Ames Institutional Scientific Collection," Alan Wood, Wyle/NASA
- "Improving the interpretation of spaceflight RNA sequencing data with spike-in controls," Zhe Zhang, Children's Hospital of Philadelphia
- "Epigenetic mechanisms of myoblast differentiation in hypergravity culture," Takeshi Imura, Hiroshima University

Fluid Physics 1 - Fluid Techniques - **Glen Echo**

Co-Chairs: Jason Hartwig, NASA Glenn Research Center, Mohammad Kassemi , NASA Glenn Research Center

- "Mass Accommodation Coefficients of Cryogenic Propellants," Kishan Bellur, Michigan Technological University
- "Development of whole-field planar optical diagnostics for thermometry in the ZBOT experiment, " Manoochehr Koochesfahani, Michigan State University
- "Zero Boil Off Tank (ZBOT) Experiment," Mohammad Kassemi , NASA Glenn Research Center
- "Exponential Vaporization Fronts and Critical Heat Flux on a Thin Strip Heater," Alexander Yarin, University of Illinois at Chicago

Microbes - 1- **Linden Oak**

Chair: Jamie Foster, University of Florida

- "Does Space Station Microbiome Differ from Any Earth Microbiome?" Kasthuri Venkateswaran, Jet Propulsion Laboratory
- "Fungal Biofilms – Preliminary Results of Penicillium rubens biofilm formation," Luis Zea, BioServe Space Technologies
- "Can we track succession and persistence of microbial communities in ISS?" Nitin Singh, NASA-JPL-Caltech
- "Microbial Tracking-2: Observing Potential Pathogenic Bacteria, Fungi, and Viruses in the ISS," Crystal Jaing, Lawrence Livermore National Laboratory

Plants 1 - Plants on Earth - **White Flint Amphitheater**
Chair: Thomas Graham, University of Guelph

- "The receptor-like kinase ERULUS regulates root hair tip growth through actin and calcium," Elison Blancaflor, Noble Research Institute LLC
- "Asphyxiation of plant cultures in Petri dishes ," Souvik Banerjee, Iowa State University
- "Columella Cells: Statolith Mechanics and the Cortical Endoplasmic Reticulum," Paul Todd, Techshot, Inc.
- "Finding Water – Using Wax Printed Paper as a Method to Study Root Hydrotropism," Kara Lind, Iowa State University
- "A Preliminary Study on the Impact of Simulated Galactic Cosmic Rays to Crop Seeds," Ye Zhang, NASA-Kennedy Space Center
- "Hydrogel-based "transparent soils" for root phenotyping in vivo," Lin Ma, iowa state University

For a more detailed and up to date view of sessions please visit:
xcdsystem.com/asgsr/program

Cardiovascular: The effects of microgravity on the cardiovascular system - **Salon E**

Co-chairs: Michael Delp, Florida State University, Candice Tahimic, NASA Ames Research Center/KBR Wyle

- "Effects of Spaceflight on Jugular Venomotor Responses in Mice," Michael Delp, Florida State University
- "Spaceflight induces subtle changes in mouse coronary artery function," Pooneh Bagher, Texas A&M University
- "Vascular Differences in Astronauts and Human HDT by VESGEN Supports Need for Space Biology Research," Patricia Parsons-Wingerter, NASA Ames Research Center
- "Microgravity Effects on the Function of Vascular Endothelial Cells ," Josephine Allen, University of Florida
- Potential countermeasure to prevent multiple tissue degeneration due to simulated spaceflight, Ann-Sofie Schreurs, NASA ARC, KBRWyle

Combustion 2: Droplets - **Forest Glen**

Co-chairs: C. Avedisian, Cornell University, Michael Hicks, NASA - Glenn Research Center

- "Combustion of N-decane and N-propylbenzene droplets: data analysis and effect of droplet diameter," Anthony Reeves, Cornell University
- "Oscillatory cool flame behavior of submillimeter sized n-heptane droplets, " Fahd Alam, University of South Carolina
- "Hot and cool-flame combustion of n-dodecane droplets at moderately high pressures in microgravity ," Daniel Dietrich, NASA Glenn Research Center
- "Investigating the role of preferential vaporization during multi-component fuel droplet combustion," Tanvir Farouk, University of South Carolina
- "The High Pressure Microgravity Combustion Facility – Motivation, Status and Capabilities," Michael Hicks, NASA - Glenn Research Center
- "Science Discovery Opportunities with the High Pressure Microgravity Combustion Facility," Meredith Colket, UTRC, retired

Education and Outreach - Inspiring on Earth and taking flight - **Linden Oak**

Chair: Samantha McBride

- "Development of an Undergraduate Course: Space Biology - Human Health and Disease from Space to Earth," Andrea Henle, Carthage College
- "STEM Experiments on the International Space Station, " Danny Kim, Quest for Space
- "Space Science Outreach to Initiate Early Interest in STEM," Samantha McBride, MIT
- "GeneLab for High Schools – Growing the Next Generation of Scientists," Elizabeth Blaber, NASA Ames Research Center
- "Launch Your Student STEM Science Experiment to Space and Back within the Nine Month School Year," Dan Saldana, Valley Christian High School of San Jose
- "Überflieger - Launching the Next Generation of Explorers to the ISS," Carie Lemack, DreamUp; Johannes Weppler, DLR

Fluid Physics 2 - Fluid Management - **Glen Echo**
Co-chairs: Henry Nahra, NASA Glenn, Xiongjun Wu, Dynaflow Inc.

- "Experimental analysis of self reweting fluid performance in heat pipe configuration," Stefan Van Vaerenbergh, Université Libre de Bruxelles, MIcrogravity Research Center
- "Brazing of Aluminum Alloys in Space: Experiments and Modeling," Cheng-Nien Yu, University of Kentucky
- "Room Temperature Screen Compliance Experiments for Liquid Acquisition Device Screens," Jason Hartwig, NASA Glenn Research Center
- "Preparation of a DYNASWIRL® Phase Separator for Tests on International Space Stations," Xiongjun Wu, Dynaflow Inc.
- "Numerical analysis of gas-liquid two-phase flow separator performance in microgravity," Yasuhiro Kamotani, Case Western Reserve University
- "Multiscale Numerical Simulation of Bubbly Flow in a Space Phase Separator," Jingsen Ma, Dynaflow, Inc.

Plants 2 - Plants Off Earth (I) - **White Flint Amphitheater**
Chair: Alexander Meyers, Ohio University

- "Using Brachypodium distachyon to Investigate Monocot Plant Adaptation to Spaceflight," Shih-Heng Su, Laboratory of Genetics
- "Changes in cell wall components of space-grown Arabidopsis roots uncovered by comparative glycomics," Jin Nakashima, Noble Research Institute
- "Analysis of Root System Architecture of Arabidopsis grown on the International Space Station," Richard Barker, UW Madison
- "Arabidopsis GRO (Gravitational Response Omics): Plant Habitat (PH- 01)," Norman Lewis, Washington State University
- "Fractional Gravity Reveals the Gravity Perception Threshold in Roots," Chris Wolverton, Ohio Wesleyan University
- "Uncovering Transcriptional Responses to Fractional Gravity in Arabidopsis Roots," Imara Perera, North Carolina State University

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Combustion 3: Material Flammability - **Forest Glen**

Co-chairs: Ya-Ting Liao, Case Western Reserve University, Sandra Olson, NASA Glenn Research Center

- "Flame dynamics of preheated thermally thick solid fuel during a step transition from normal gravity," Michael Johnston, Case Western Reserve University
- "Ellipsoidal combustion model for BRE flames in microgravity," Akshit Markan, University of Maryland
- "Effect of Flow Velocity on Flame Spread Processes over a Large Solid Fabric in Concurrent Flow," Chengyao Li, Case Western Reserve University
- "Low-Pressure Stagnation Flame Blowoff of a Burning Cast PMMA Cylinder in Axial Mixed Convective Flow," Sandra Olson, NASA Glenn Research Center
- "The effect of buoyancy on downward flame spread over PMMA cylinders," Maria Thomsen, University of California Berkeley
- "Chemistry on the International Space Station; Opportunities and limitations," Kenneth Savin, CASIS
- "Effects of Area Density on Concurrent Flow Flame Spread Over a Thin Fuel in Normal and Microgravity," Anthony Vetturini, Case Western Reserve University
- "Influence of oxygen concentration on flame structure and spread in microgravity," Luca Carmignani, San Diego State University

Complex Fluids - 1 - **Glen Echo**

Co-chairs: Francis Chiaramonte, NASA, John Eustace, ZIN Technologies, Inc

- "Crystallization of Hollow Silica Cubes in Microgravity," Mena Youssef, New York University
- "Development and rheological characterization of non-volatile bijels," Herman Ching, University of California
- "Design and Development of Temperature Gradient Induced Crystallization Studies of Liquid Crystals," Deborah Essumang, University of Maryland
- "Molecular Dynamics Simulations of Binary Colloidal Mixtures of Silica and Zirconia Particles," Marzieh Moradi, University of Louisville
- "Colloidal nanoplate liquid crystals in external fields," Zhengdong Cheng, TAMU
- "Microwheels, Microroads, and Microchains: Enhanced Translation via Applied Rotating Fields," Marr David, Chemical and Biological Engineering Dept.
- "Summary of 2018 LMM Physical Science Experiments on ISS," Ronald Sicker, NASA GRC

Microbes - 2 - **Linden Oak**

Chair: Kasthuri Venkateswaran, Jet Propulsion Laboratory

- "Fusarium oxysporum isolates from the ISS represent a novel strain with possible virulence in humans," Camilla Urbaniak, Jet Propulsion Laboratory
- "Unwanted but there – fighting microbial biofilms in space by the ESA project BIOFILMS," Ralf Möller, DLR - German Aerospace Center
- "Bacillus subtilis Biofilms in the Human Spaceflight Environment," Wayne Nicholson, University of Florida
- " Lack of Concordance Between Bacillus subtilis Spaceflight and Clinostat Transcription Profiles," Michael Morrison, University of Florida
- "UV Shielding by Martian Dust Simulant JSC MARS-1 of Bacillus pumilus SAFR-032," Jordan McKaig, NASA ARC
- "Microgravity Compatible Preconcentrator System for the Microbial Monitoring of the ISS Water Sample," Snehit Mhatre, California Institute of Technology, Jet Propulsion Laboratory

Enabling Technologies - 2 - **Salon E**
Chair: Erika Wagner, Blue Origin

- "SpaceShipTwo: A Suborbital Vehicle for Human Spaceflight and Microgravity Research," Sirisha Bandla, Virgin Galactic
- "Human Space Radiation Resistance: Paving the way from a multispecies approach," Emmanuel Urquieta, Translational Research Institute for Space Health
- "Non-Invasive Monitoring and Biologics Manufacturing: Critical Technologies for Long-Term Missions," Govind Rao, Center for Advanced Sensor Technology
- "Software and Development Support for Aeronautic and Astronaut Crew Cognitive State Monitoring," Aubrey Lokey, Cleveland State University
- "Application of VESGEN to heart vasculature," Ann-Sofie Schreurs, NASA ARC, KBRWyle
- "Evaporation in microgravity: recent results from the ISS CSELS experiment," Mark Weislogel, Portland State University
- "The done, doable, and daunting challenges of life support plumbing aboard spacecraft," Mark Weislogel, Portland State University
- "Surface Tension Containment Experiment - Increasing Science Throughput on ISS," Eugene Ungar, nonw
- "Determining an Appropriate Clinostat Rotational Speed," Luis Zea, BioServe Space Technologies

Musculoskeletal System I - **White Flint Amphitheater**
Co-Chairs: Elizabeth Blaber, NASA Ames Research Center, Nabarun Chakraborty, USACEHR

- "A predictive model for the bone mineral density loss of astronauts in a mission to Mars," Eneko Axpe, Stanford University
- "Combined Effects of Simulated Microgravity and Radiation Exposure on Osteoclast Cell Fusion," Honglu Wu, NASA-JSC
- "Weight loss of space flown murine muscle linked to energy deprivation: A mRNA sequencing analysis," Nabarun Chakraborty, USACEHR
- "Regulation of skeletal muscle remodelling and energy metabolism genesets by the Vitamin D receptor," Joseph Bass, University of Nottingham
- "Performance-Based Correlates Using a High-Speed High-Impact Resistive Device for Osteogenesis," Prashant Parmar, Saint Joseph / National Jewish Hospital
- "Rodent Research 5 mission: NELL-1-based therapy prevents spaceflight-induced osteoporosis in rodents," Jin Hee Kwak, UCLA School of Dentistry
- "Human-Vibration Isolation System (VIS) Interactions during Squat and Row Exercises," Stephanie Carey, University of South Florida

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Central Nervous System - **White Flint Amphitheater**

Chair: YSharmila Bhattacharya, NASA Ames Research center

- "Results from the MVP-Fly-01 spaceflight experiment conducted on the ISS with Drosophila melanogaster," Sharmila Bhattacharya, NASA Ames Research center
- "Correlated protein and RNA expression in brains from fruit flies raised aboard the ISS," Karen Ocorr, SBP Medical Discovery Institute
- "Pain management during space mission: A transcriptomic study using brain tissues obtained from NASA," Nabarun Chakraborty, USACEHR
- "Gender Differences in the Hindlimb Suspension Response of the Rat Retina," Susana Zanello, KBRwyle-NASA JSC
- "Acute effect of spaceflight on ocular structure, intraocular pressure and retina," Xiao Wen Mao, Loma Linda University

Combustion 4: Gaseous Flames - **Forest Glen**

Co-Chairs: Derek Dunn-Rankin, University of California, Irvine, Fumiaki Takahashi, Case Western Reserve University

- "Analysis of partially premixed flames during the autoignition of non-premixed mixtures," George Gogos, University of Nebraska Lincoln
- "Stabilization of Laminar Jet Diffusion Flames," Logan Smith, Case Western Reserve University
- "Numerical Simulations of Laminar Nonpremixed CH4-Air Flames Varying Buoyancy and Applied E-Field," Claudia-Francisca Lopez-Camara, University of California at Irvine
- "Experimental Study Highly Diluted and Sooting Methane Coflow Flames In Microgravity," Jesse Tinajero, Yale University
- "Ignition and Control of Hydrothermal Flames in Supercritical Water Oxidation Reactors," Michael Hicks, NASA - Glenn Research Center
- "Microgravity Experiments of Electric Field Effects on Laminar Ethylene/Air Diffusion Flames," Yu-Chien Chien, University of California, Irvine

Complex Fluids - 2 - **Glen Echo**

Co-Chairs: William Meyer, USRA at NASA Glenn Research Center University, Leah Pate, NASA JSC ISS Research Integration Office

- "Coarsening of two-dimensional island emulsions in thin, spherical bubbles of smectic liquid crystal," Eric Minor, University of Colorado
- "Electric Field-Driven Structuring in Colloids," Boris Khusid, New Jersey Institute of Technology
- "Quantitative Modeling of Growth of Colloid Nuclei," Lou Kondic, NJIT
- "Clog-free Femto-liter Inkjet Devices for Materials Research in Microgravity," Hiroshi Yokoyama, Kent State University
- "Ferromagnetic liquid crystal colloids under applied magnetic fields in microgravity," Cheol Park, University of Colorado
- "Preparatory Measurements of Molecular Diffusion in Multicomponent Liquid Systems containing nanopart," Stefan Van Vaerenbergh, Université Libre de Bruxelles, MIcrogravity Research Center

Enabling Technologies - 3 - **Salon E**

Chair: Dave Reed, Techshot

- "Life Beyond Low Earth Orbit" Science Working Group Report," Robert Ferl, University of Florida
- "NASA's BioSentinel mission: an autonomous platform for life science studies on ISS and beyond," Sergio Santa Maria, University of New Mexico / NASA Ames Research Center
- "Metagenomic assessment of blood samples for heath monitoring in long duration spaceflight," Cassandra Juran, Universities Space Research Association (USRA)
- "Adapting SPGE to one-step RNA extraction for ISS SmartCycler analysis," Niel Crews, Louisiana Tech University
- "Development of a Downstream Bioproduct Purification System for In-Space Biomanufacturing," Anna-Sophia Boguraev, Yale University
- "Sensor Selection and Implementation for an Autonomous Experimental Evolution Biofluidics System," Chinmayee Govinda Raj, Student
- "A Reusable Balloon-based Payload for Stratospheric Microbial Exposure and Aerosol Sampling," Kireet Agrawal, Space Technologies at Cal
- "In flight miRNA isolation and recovery on the ISS," Emily Johnson, KBRWyle

Fundamental Physics and Quantum Applications - **Linden Oak**

Co-Chairs: Inseob Hahn, JPL, Ulf Israelsson, JPL

- "The DLR/NASA Bose-Einstein Condensate Cold Atom Laboratory for the International Space Station," Ulf Israelsson, JPL
- "Accuracy Evaluation of the ACES/PHARAO Laser-cooled Atomic Clock for the ISS," Kurt GIbble, Penn State University
- "Measurement of the Rydberg Constant using Cold Circular Rydberg Atoms," Georg Raithel, University of Michigan
- "Experimental observation of cnoidal wave structures of dust acoustic waves," Gurudas Ganguli, US Naval Research Laboratory
- "DECLIC ALI-R: Ground and ISS test results," Inseob Hahn, JPL

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Fluid Physics 3 - Liquid Phase Change - **Glen Echo**

Co-Chairs: Jeffrey Didion, NASA Goddard Space Flight Center, Mohammad Hasan, NASA Glenn

- "Scaling of Pool Boiling Heat Transfer: Numerical Simulations and Validation," Amir Riaz, University of Maryland
- "Flow Boiling Experiments Using the Flow Boiling and Condensation Experiment (FBCE) Breadboard Test B," Henry Nahra, NASA Glenn
- "Experimental Investigation and Modeling of Density Wave Oscillations in Vertical Upflow Boiling," Lucas O'Neill, Purdue University
- "Large Length Scale Leidenfrost Phenomena: Recent Results from Drop Tower Experimentation," Rawand Rasheed, Portland State University
- "Electrically Driven Liquid Film Flow Boiling In the Absence of Gravity," Jeffrey Didion, NASA Goddard Space Flight Center
- "Test Section Image Quality Characterization of Flow Boiling Module for Microgravity Experiment," Jeffrey Mackey, Vantage Partners, LLC

Materials Science - **Forest Glen**

Co-Chairs: Richard Banish, UAH, Jonghyun Lee, Iowa State University

- "Dynamic Control of Macromolecular Crystal Growth in Space; Why Not?," Paul Todd, Techshot, Inc.
- "Simulated Space Environment Effect on Inorganic-Polyimide Nanocomposites," Keith Gordon, NASA Langley Research Center
- "Ionizing nanocomposites for efficient gamma- ray sensors," Narsingh Singh, University of Maryland
- "Accelerated Materials Testing in Low Earth Orbit," Kevin Heath, Alpha Space Test and Research Alliance, LLC
- "Thermal Characterization of Polyimide Aerogel/RTV-655 Compound for Space-based Propellant Tanks," Ken Mitchell, The University of Memphis

Microbes - 3 - **Salon E**

Chairs: Wayne Nicholson, University of Florida

- "BioSentinel: Optimizing conditions for improved yeast cell viability after long term desiccation," Kaixin Cui, University of Colorado Boulder, Space Life Sciences Training Program (SLSTP) NASA Ames Research Center
- "Microgravity Modulates Bacterial Diversity and Abundance in the Rodent Gut Microbiome," Joseph Bedree, University of California-Los Angeles
- "Low shear modeled microgravity enhances the shedding of the endotoxin lipopolysaccharide from the sy," Jamie Foster, University of Florida
- "Can bacterial cells sense the changes in mechanical forces due to microgravity at their surface?" Sandhya Singh, Department of Physics, Savitribai Phule Pune University
- "Effects of Microgravity on the Physiology and Fitness of Shewanella oneidensis MR-1," Michael Dougherty, KBRWyle

Plants 3 - Plants Off Earth (II) - **Linden Oak**

Chair: Ye Zhang, NASA-Kennedy Space Center

- "Preliminary Results and Ops Experience from Biological Suborbital Flights," Robert Ferl, University of Florida
- "Using mathematical modeling and natural variation to investigate root growth behavior and responses," Shih-Heng Su, Laboratory of Genetics, University of Wisconsin, Madison, WI, USA;
- "Role(s) of calmodulin-like gene networks in response to spaceflight-related stresses," Simon Gilroy, University of Wisconsin-Madison
- "Spaceflight Epigenomics: DNA Methylation and Gene Expression in Arabidopsis grown on the ISS," Anna-Lisa Paul, University of Florida
- "Hardware Validation Test of the Advanced Plant Habitat," Oscar Monje, Kennedy Space Center
- "Carbon Dioxide Management as a Method to Alter Plants Homeostasis," Oskar Siemianowski, Iowa State University

Reproduction and Human Factors - **White Flint Amphitheater**

Co-Chairs: April Ronca, NASA Ames Research Center, Joseph Tash, University of Kansas Medical Center, Department of Molecular and Integrative Physiology, and GametBio, LLC

- "Learning Dynamic Stabilization in a Spaceflight Analog Task," Vivekanand Vimal, Brandeis University
- "From Antarctica to Alzheimers - Excercise Helps to Prevent Cognitivie Decline," Stefan Schneider, Center for Health and Integrative Physiology in Space, German Sport University
- "Deep Learning Classification of Estrous Cycle Phases in Mice," Andrew Jong, San Jose State University
- "The Effects of Simulated Spaceflight Conditions on the Myometrium of the Mouse Uterus," Ahmed Elgazzar, student
- "The NASA Twins Study: A Multi-omic And Physiological Analysis Of A Year-long Human Spaceflight," Tejaswini Mishra, Stanford University

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Enabling Technologies - 4 - **Salon E**

Chair: April Spinale, CASIS/Bionetics

- "GeneLab: "Omics" Data Systems for Spaceflight and Simulated Spaceflight Environment," Sylvain Costes, NASA Ames Research Center
- "Detecting Differentially Activated miRNAs from Proteomics Data in Response to Spaceflight Stresses," Daniel Mattox, Universities Space Research Association
- "Antimicrobial Resistance Patterns in Spaceflight: A GeneLab Study," Lindsay Rutter, Iowa State University
- "Increasing the Statistical Rigor of Cross-Species Differential Expression Analysis," Alex Hyer, NASA Ames Research Center
- "Drugs In Space: RNA Folding, Protocells, and Pharmaceutical Production in Microgravity," Nicholas Bense, NASA Ames Research Center/University of Akron

Immune: Alterations to the immune system and immunity during spaceflight or simulates spaceflight - **White Flint Amphitheater**

Co-Chairs: Amber Paul, USRA and ARC, Michael Pecaut, Division of Biomedical Engineering Sciences, Department of Basic Sciences, Loma Linda University

- "Neutrophil to lymphocyte ratio: A prognostic indicator for astronaut health," Amber Paul, USRA and ARC
- "Novel Models to Monitor in Vivo Effects of SPE/GCR radiation on Human Hematopoietic and GI Systems," Christopher Porada, Wake Forest Institute for Regenerative Medicine
- "FFL03: Successful Development of Drosophila Parasites Aboard the International Space Station," Shubha Govind, City University of New York, Graduate Center & City College
- "Spaceflight Induces Gut Microbiome Changes Similarly to Sleep Loss but not Space-Type Radiation," Peng Jiang, Northwestern University
- "Effects of spaceflight and simulated microgravity on a host-pathogen system," Rachel Gilbert, NASA Ames Research Center
- "Effects of Spaceflight on Cervical Prenodal Lymphatic Function in Mice," David Zawieja, Texas A&M University - Health Science Center

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Fluid Physics 4 - Fluid Mechanistics - **Glen Echo**

Co-Chairs: Amir Hirsa, Rensselaer Polytechnic Institute, John McQuillen, NASA Glenn Research Center

- "Electrostatic Faraday Instability in Thin Films- Opposing Gravity on Ground by Using Electrostatics," Dipin Pillai, University of Florida
- "Ring-Sheared Drop (RSD) Module for the Study of Amyloid Fibril Formation," Amir Hirsa, Rensselaer Polytechnic Institute
- "Dynamics of an Ideal Fluid in a Rectangular Channel," Josh McCraney, Cornell University
- "Computational modeling of Capillary flows in Microgravity," Santhosh Kumar Muniyal Krishna, Washington State University
- "Manipulating Condensation Heat Transfer with a Switchable Wettability Surface," Jonathan Ludwicki, Cornell University
- "Capillary-flow Growth Bed for Micro Flowering Aquatic Plants," Capillary-flow Growth Bed for Micro Flowering Aquatic Plants

Materials Science: Levitation - **Forest Glen**

Co-Chairs: Douglas Matson, Tufts University, Michael SanSoucie, NASA Marshall Space Flight Center

- "Levitation Experiments on ISS: Science and Applications," Michael SanSoucie, NASA Marshall Space Flight Center
- "Thermophysical Property Measurements of Silicon-Cobalt Alloys," Richard Banish, UAH
- "Deformation induced frequency shifts during microgravity pulse oscillation of levitated droplets," Douglas Matson, Tufts University
- "Faraday forcing of high-temperature levitated metal drops for the measurement of surface tension," Nevin Brosius, University of Florida, Department of Chemical Engineering
- "Measured Electrical Resistivity of Metallic Binary Liquid Alloys on the ISS," Daniel Van Hoesen, Washington University in St. Louis
- "Numerical Prediction of Oscillation of a Copper-Cobalt Concentric Compound Droplet," Jonghyun Lee, Iowa State University

Microbes - 4 - **Salon E**

Chair: David Smith, NASA Ames Research Center

- "EcAMSat: Small Satellite to Examine E. coli's Response in Microgravity to the Antibiotic Gentamicin," Matthew Lera, KBRwyle
- "Antibiotic resistance in spaceflight: integrating mutational, transcriptome, and phenotypic analyses," Patricia Fajardo-Cavazos, University of Florida
- "Can simulated microgravity make bacteria resistant to antibiotics, the impact on astronaut health," Camilla Urbaniak, Jet Propulsion Laboratory
- "Impacts of microgravity on the differentiation capacity of myoblast," Oludunsin Samuel-Ojo, Johns Hopkins University
- "Shedding of latent herpes viruses in crewmember and International space station environment," Satish Mehta, NASA Johnson Space Center
- "Analysis of changes in cellular transcription coinciding with radiation-induced reactivation of EBV," David Bloom, University of Florida

Musculoskeletal System II - **White Flint Amphitheater**

Co-Chairs: Eneko Axpe, Stanford University, Jeffrey Willey, Wake Forest School of Medicine

- "Does irradiation alter YAP/TAZ signaling dependent on the LINC complex of the nuclear envelope?" Elizabeth Talburt, Embry-Riddle Aeronautical University
- "CDKN1a/p21 plays a critical role in suppressing stem cell regenerative potential during aging," Margareth Cheng-Campbell, Blue Marble Space at NASA Ames
- "In Vitro Muscular Atrophy Model With Suspended Muscle Fibers," Matthew Clegg, Utah State University
- "Recovery (4-wks) in Mice after 30-day ISS Flight Restores Strength but Only Partially Muscle Mass," Louis Stodieck, BioServe Space Technologies
- "A Novel Rat Partial Gravity Analogue for Longitudinal Investigations: Musculoskeletal Alterations," Marie Mortreux, Harvard Medical School - Beth Israel Deaconess Medical Center
- "Simulating Muscle Atrophy due to Microgravity and Ionizing Radiation," Lori Caldwell, Utah State University

Plants 4 - Eating Plants Off Earth - **Linden Oak**

Chair: Chris Wolverton, Ohio Wesleyan University

- "Growing Beyond Earth: Data Validation of a Citizen Science Project," Marion Litzinger, Fairchild Tropical Botanic Garden
- "New Leafy Green Crops for Space Food Production," Raymond Wheeler, NASA
- "Growth and Photosynthetic Responses of Chinese cabbage to an ISS-like Environment," Cary Mitchell, Purdue University
- "Demonstration of Simultaneous Multi-Species Growth in the Veggie Vegetable Production Systems on ISS," Ye Zhang, NASA-Kennedy Space Center
- "Duckweed to LilyPond Water Lentils™: A Nutrient Dense Crop for Crew Diets," Christine Escobar, Space Lab Technologies, LLC
- "Performance of Potatoes in the Astro Garden Crop Production System," Robert Morrow, Sierra Nevada Corporation

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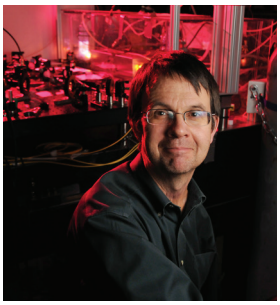


Eric Cornell, University of Colorado

Eric Cornell received his B.S. from Stanford University in 1985, and his PhD from MIT in 1990. His doctoral research, with Dave Pritchard, was on precision mass spectroscopy of single trapped molecular ions. Cornell went to JILA in Boulder, Colorado in 1990. Since 1992 he has been a senior scientist with the National Institute of Standards and Technology. He is a Fellow of JILA and Professor Adjoint in the Physics Department of the University of Colorado.

Research interests include various aspects of ultracold atoms -- in particular, Bose-Einstein condensation, strongly interacting Bose gases, and chip-based atom traps. He is also working on using precision molecular spectroscopy to explore possible extensions to the Standard Model of particle physics. His most recent research includes a project to measure the electric dipole moment of the electron, a project designed to investigate the particle physics concept known as "supersymmetry."

Cornell received the Stratton Award from NIST in 1995, the Carl Zeiss Award in 1996, the Fritz London Prize in 1996, the Presidential Early Career Award for Scientists and Engineers in 1996, the 1997 I.I. Rabi Award, the 1997 King Faisal International Prize for Science, the 1995-96 AAAS Newcomb-Cleveland Prize, the 1997 Alan T. Waterman Award, the Lorentz Medal in 1998, in 1999 the R. W. Wood Prize and the Benjamin Franklin Medal in Physics, and in 2000 was elected as a Fellow of the Optical Society of America and a Member of the National Academy of Sciences. In 2005, he was elected Fellow of the American Academy of Arts and Sciences, and in 2012 he was awarded the Ioannes Marcus Marci Medal for Molecular Spectroscopy. He shares the 2001 Nobel Prize in Physics with Carl Wieman and Wolfgang Ketterle.

Ellen Stofan, National Air and Space Museum

Dr. Ellen Stofan is the John and Adrienne Mars Director of the Smithsonian's National Air and Space Museum. She comes to the Museum with more than 25 years of experience in space administration and planetary science. Dr. Stofan was previously Chief Scientist at NASA, serving as the principal advisor to the Administrator on science programs and strategic planning.

She held senior scientist positions at NASA's Jet Propulsion Laboratory, including work on missions exploring Venus, Earth, Mars, and Saturn. She served as chief scientist for the New Millennium Program, and principle investigator on the proposed Titan Mare Explorer.

Dr. Stofan holds master's and doctorate degrees in geological sciences from Brown University, and a bachelor's degree from the College of William And Mary. She is an honorary professor at University College London, and was on the board of the College of William & Mary Foundation for 10 years, serving as board chair and co-chair of the development committee as it planned a $1 billion fundraising campaign.

Undergrad/Graduate Student Posters

ID	Abstract Title	School Level	First Name	Last Name	Affiliation
SP1	Applications of In Situ Additive Manufacturing on Mars	Undergraduate	Ethan	Curtis	University of Michigan
SP2	Flow Testing for Orbital Syngas Commodity Augmentation Reactor for Microgravity Waste Conversion.	Undergraduate	Kathryn	Ludden	NASA - Intern
SP3	Light Microscopy Module and Colloid Behavior In Microgravity	Undergraduate	Shavette	Thompson	Lawson State Community College
SP4	Liquid Crystal Film Device.	Undergraduate	Deborah	Essumang	University of Maryland
SP5	Analysis of Early Gravity Response Genes in Arabidopsis	Undergraduate	Ava	Heller	Ohio University
SP6	In Space Biomanufacturing with CO2 using Methylobacterium extorquens	Undergraduate	Tristan	Caro	UC Berkeley
SP7	Pathogenesis of Microbes in Simulated Microgravity	Undergraduate	Nhung	Tran	University of California, San Diego
SP8	The Impact of Spaceflight on Circulating Blood Cell Populations	Undergraduate	Nina	Nishiyama	Loma Linda University School of Medicine
SP9	Simulated microgravity and the eye: effect of hindlimb suspension on cell survival in the rat retina	Undergraduate	Susie	Song	Universities Space Research Association
SP10	Short and Long Duration Mechanical Unloading of p21 Knockout Mice: MicroCT Analysis of the Femur	Undergraduate	Shiyin	Lim	Blue Marble Space at NASA Ames; Santa Clara University
SP11	The placenta as a possible interface for cross-generational changes in gene expression	Undergraduate	Molly	Heit	KBRWyle
SP12	The Effects of Naturally Occurring Upper Atmosphere Radiation on Seeds of Arabidopsis thaliana.	Undergraduate	Rachel	Tucker	University of Florida Space Plants Lab
SP13	Measurement Of Freely Suspended Film Thickness By Using Optical Reflectivity.	Undergraduate	Deborah	Essumang	University of Maryland
SP14	The effects of a cosmic radiation analog environment on Arabidopsis thaliana seeds	Undergraduate	Juliana	Cromie	University of Florida
SP15	Fuel Droplet Evaporation Measurements at Ambients Approaching Critical Point	Undergraduate	Clara	Vorndran	Cornell University: The College of Arts and Sciences
SP16	Two Phase Flow Software and Avionics Support.	Undergraduate	Aubrey	Lokey	Cleveland State University
SP17	The Smart Extraterrestrial Environment Design (SEED)	Undergraduate	William	Sharpless	UC - Berkeley
SP18	The Effects of Simulated Spaceflight Conditions on the Myometrium of the Mouse Uterus	Undergraduate	Ahmed	Elgazzar	student
SP19	Short and Long Duration Mechanical Unloading of p21 Knockout Mice: MicroCT Analysis of the Femur	Undergraduate	Shiyin	Lim	Blue Marble Space at NASA Ames; Santa Clara University
SP20	Variable-G Athletics	Undergraduate	Daniel	Gove	Student Board Member
SP21	Thermal Characterization of Polyimide Aerogel/RTV-655 Compound for Space-based Propellant Tanks	Undergraduate	Ken	Mitchell	The University of Memphis
SP22	Effect of Heat Pipe Cooling Temperature on the Heat Transfer and Interfacial Forces in Microgravity.	Graduate	Jiaheng	Yu	Rensselaer Polytechnic Institute
SP23	Microgravity Flow Boiling Heat Transfer: Single-Phase Flow Simulations Using Local Liquid Velocity	Graduate	Caleb	Hammer	U. of Maryland
SP24	Measurement of Mass Evaporation and Density of Ni-based Super alloy by Electrostatic Levitation(ESL)	Graduate	Jannatun	Nawer	Tufts Univeristy
SP25	Initial Results of the Effects of Stirring on Nucleation in Supercooled Liquid Alloys	Graduate	Mark	Sellers	Washington University in St. Louis
SP26	Microgravity Studies of Nanoparticles and Topological Defects in Liquid Crystal Thin Films.	Graduate	Adam	Susser	Case Western Reserve University
SP27	Impaired Gait Patterns in Mice After 30 Days of Spaceflight.	Graduate	Andy	Kwok	Wake Forest School of Medicine
SP28	EMCS-PGP: Plant response under fractional gravity	Graduate	Alexander	Meyers	Ohio University
SP29	Microgravity Impairs Anti-Leukemic Activity of Human NK Cells.	Graduate	Bradford	Kuhlman	Wake Forest Institute for Regenerative Medicine
SP30	Brownian motion of anisotropic particles in microgravity	Graduate	Seong-Geun	Jeong	Chungnam National University
SP31	Fabrication of anisotropic hexagram particles with regioselectivity of patches	Graduate	Gyurak	Shim	Chungnam National University
SP32	The Contribution of Sleep Disruption in the Physiological Impact of a Spaceflight Analog.	Graduate	Katrina	Campbell	Northwestern University
SP33	Thermocapillary Induced Oscillations of a Fiber-Supported Droplet in Microgravity	Graduate	Evan	Rose	Case Western Reserve University
SP34	IN VITRO NEURAL HEALTH AFTER SIMULATED GALACTIC COSMIC RAY EXPOSURE: A PILOT STUDY	Graduate	Robert	Hinshaw	Massachusetts Institute of Technology
SP35	A Role for ABA-Mediated Signaling in Plant Adaptations to Microgravity	Graduate	Eric	Land	North Carolina State University
SP36	Possible role of heat shock transcription factor 4 in differentiation of skeletal muscle cells	Graduate	Risa	Fujimoto	Toyohashi SOZO University
SP37	The Role of SKU6/SPIRAL1 in Terrestrial & Spaceflight Root Skewing Elucidated by Gene Expression	Graduate	Nicole	Beisel	University of Florida
SP38	A SKU5 Mutation Alters the Developmental Transcriptome of Arabidopsis thaliana Roots in Spaceflight.	Graduate	Brandon	Califar	University of Florida
SP39	Long term colloid suspension in a vertically rotating system	Graduate	Md Mahmudur	Rahman	University of Louisville
SP40	Simulated Microgravity-Induced Genomic Alterations in Breast Cancer Cells	Graduate	Atul	Dhall	SUNY Polytechnic Institute
SP41	Metagenomic monitoring of microbial populations on orbit	Graduate	Molly	Coyne	NASA Ames Research Center
SP42	Ground validation studies for testing loss of muscle strength in C. elegans on ISS.	Graduate	Taslim	Anupom	Texas Tech University
SP43	Energy Expenditure and Social/Group Dynamics in Extreme Environments	Graduate	Mallika	Sarma	University of Notre Dame
SP44	The effect of gamma radiation on imbibed wheat seeds	Graduate	Sandhya	Singh	Savitribai Phule Pune University.
SP45	Mass Accommodation Coefficients of Cryogenic Propellants.	Graduate	Kishan	Bellur	Michigan Technological University
SP46	In Vitro Muscular Atrophy Model With Suspended Muscle Fibers.	Graduate	Matthew	Clegg	Utah State University
SP47	A manganese-based antioxidant to reduce spaceflight associated oxidative stress in MLO-Y4 osteocytes	Graduate	Simranjit	Kalotia	NASA Ames Research Center
SP48	Arcillite as a Medium for Growth of Radishes in Microgravity	Graduate	Brittany	Pitrucha	University of Louisiana at Lafayette
SP49	Finding Water – Using Wax Printed Paper as a Method to Study Root Hydrotropism	Graduate	Kara	Lind	Iowa State University
SP50	Hydrogel-based “transparent soils” for root phenotyping in vivo	Graduate	Lin	Ma	Iowa state University
SP51	Asphyxiation of plant cultures in Petri dishes	Graduate	Souvik	Banerjee	Iowa State University
SP52	The effect of gamma radiation on imbibed wheat seeds	Graduate	Sandhya	Singh	Savitribai Phule Pune University.

Investigator Posters

ID	Abstract Title	First Name	Last Name	Affiliation
IN001	Neutrophil to lymphocyte ratio: A prognostic indicator for astronaut health	Amber	Paul	NASA ARC and USRA
IN003	Spaceflight duration impacts the brain function: Transcriptomic investigation of rodent brains colle	Nabarun	Chakraborty	USACEHR
IN004	High-Flying Microbes: Epigenetic Changes after Long-Term Exposure to the Stratosphere.	Samantha	Waters	NASA
IN005	Launch effects, static hypergravity and vivrations having long-lasting effects on gene expression.	Jack	van Loon	VU University Amsterdam
IN006	A novel approach to treating dental caries for long-term space exploration using microwave energy	Ivan	Stangel	BioMat Sciences
IN007	Long simulated micro-gravity influence on tissue health in a transgenic model of extended longevity	Linda	Guttmann	USRA
IN008	Evaluating spaceflight and altered gravity effects on the nervous system using D. melanogaster	Siddhita	Mhatre	University of New Mexico/FILMSS
IN009	Metabolic alterations inferred from GeneLab database as mediators of spaceflight health risks	Afshin	Beheshti	NASA Ames Research Center
IN010	Science Capabilities and Accomplishments of the Light Microscopy Module (LMM) on ISS.	William	Meyer	USRA at NASA GRC
IN011	Micro-11: Human and Bovine Sperm Function in Microgravity on the ISS	Joseph	Tash	University of Kansas Medical Center and GametBio, LLC
IN012	Radiation Tolerance in Hypsibius dujardini.	Sonali	Verma	NASA
IN013	Knockdown of HOIL-1L suppresses proliferation and differentiation of C2C12 myoblasts	Kodai	Nakamura	Toyohashi SOZO University
IN014	Homogeneous Nucleation of Uniform Protein Crystals in Low Gravity	Paul	Todd	Techshot, Inc.
IN015	TOAST-ETA an astrobotany education resource for the GeneLab data repository	Richard	Barker	UW Madison
IN016	Effects of Skeletal Unloading on the Antibody Repertoire of Tetanus Toxoid and/or CpG Treated Mice	Trisha	Rettig	Kansas State University
IN017	Space Flight Projects supported by NASA HUNCH	Nancy	Hall	NASA Glenn Research Center
IN018	Cardiovascular Hemodynamics and Body Fluid Homeostasis in Microgravity - A Computer Simulation	Yan	Zhang	North Dakota State University
IN019	Drop Tower Challenge: Plant Watering in Microgravity	Nancy	Hall	NASA Glenn Research Center
IN020	Microbial Tracking-2: Observing Potential Pathogenic Bacteria, Fungi, and Viruses in the ISS	Aram	Avila-Herrera	Lawrence Livermore National Laboratory
IN021	Defining the Effects of Mars Mission-Relevant Doses of SEP/GCR Radiation on the Small Intestine	Christopher	Porada	Wake Forest Institute for Regenerative Medicine
IN022	Preparations for a flight experiment in the Advanced Plant Habitat	Karl	Hasenstein	University of Louisiana at Lafayette
IN023	GeneLab: Open Science for Life in Space	Jonathan	Galazka	NASA Ames Research Center
IN024	Evaluation of on-orbit mouse liver preservation protocols for gene expression analysis	Amanda	Saravia-Butler	NASA Ames Research Center
IN025	Cages and calories: A ground-based analog for studying spaceflight effects on female mouse fertility	Moniece	Lowe	NASA Ames
IN026	The NASA Space Life Sciences Training Program	Jon	Rask	NASA Ames Research Center, KBRWyle
IN027	Recovery (4-wks) in Mice after 30-day ISS Flight Restores Strength but Only Partially Muscle Mass.	Louis	Stodieck	BioServe Space Technologies
IN028	A Novel Rat Partial Gravity Analogue for Longitudinal Investigations: Musculoskeletal Alterations.	Marie	Mortreux	Harvard Medical School
IN029	Acute effect of spaceflight on ocular structure, intraocular pressure and retina	Xiao Wen	Mao	Loma Linda University
IN030	Acute effect of spaceflight on ocular structure, intraocular pressure and retina	Xiao Wen	Mao	Loma Linda University
IN031	Effects of Microgravity on the Physiology and Fitness of Shewanella oneidensis MR-1	Michael	Dougherty	KBRWyle
IN032	NASA AMES INSTITUTIONAL SCIENTIFIC COLLECTION (ISC).	Danielle	Lopez	Ames Life Sciences Data Archive (ALSDA)
IN033	Growth and development of different genotypes of the model plant Medicago under clinorotation	John	Kiss	UNCG
IN034	Gravitational effects on growth of modified Arabidopsis thaliana in the ISS Advanced Plant Habitat.	Margaret	Turpin	University of New Mexico
IN035	Analysis of Genes Associated with a Novel Blue-Light Phototropic Response in Plants Utilizing RNASeq	Joshua	Vandenbrink	Louisiana Tech University
IN036	Electrospraying for Aeroponics in Microgravity	Joel	Malissa	NASA Kennedy Space Center
IN037	Diffusive Motion in a Three-Dimensional Cluster in PK-4	Bin	Liu	The University of Iowa
IN038	"We fly your research in Microgravity" The kiwi Services for Microgravity Research and Applications	Christian	Bruderrek	Airbus Defence and Space; kiwi

Gravitational and Space Research is the peer reviewed, open access journal of the American Society for Gravitational and Space Research.

Information on submission and instructions to authors for GSR can be found on the journal's web site:

GravitationalAndSpaceResearch.org

Also available on the web site are a template in Word, and an EndNoteTM style file. GSR is an open access, peer re-viewed journal which is indexed with Google Scholar, EB-SCOhost, and is under review with MedLine and Thomson-Reuters. Due to its open access format, content can also be found just by typing search terms into any web browser search engine. There are no Open Access Fees.

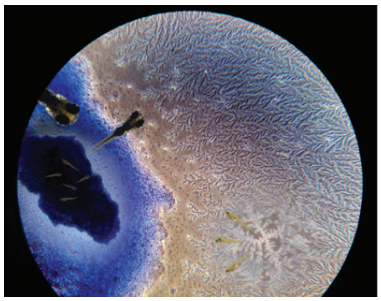
Submission is open to all. Research topics include – but are not limited to – gravitational and space biology, astrobiolo-gy, analog environment research, advanced life support (ALS), biophysics, radiation biology, hard- ware engineering and development, fluid physics, materials science, combus-tion science, and acceleration in altered gravity environ-ments. The categories of papers include Short Communica-tion, Methods, Research, Hypothesis and Review.

We look forward to receiving many high-quality papers that strongly reflect the exciting research of our members. We are the face of ASGSR.

Dr. Jamie Foster, Editor in Chief

ASGSR Art Competition!

This is your chance to showcase your creative side and your research! Again this year the conference will have an art competition, so consider submitting an entry from you or your students. Entries will be displayed during the conference and a democratic vote will be taken to determine the winners. Awards will be given for both Artistic Merit and Technical Merit categories.
Submissions will be evaluated based on their artistic merit and/or technical merit, and there will be awards for both categories.



Eligible entries include (but are not limited to): images (photographs or computer-generated), paintings, drawings, or sketches of gravitational and space research phenomena. Rearrangement, assembly, or other creative mixing of images into an art-form is appropriate and encouraged. Last year's winning art entries are shown above.

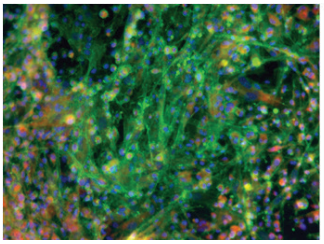
To enter, electronically submit a high resolution image with a title, list of contributing artists and their affiliations, and brief explanation of your submission to Sandra Olson (sandra.olson@nasa.gov) by October 5th, 2018. To participate, at least one of the artists is required to be a registered attendee at the meeting and the art must be displayed at the meeting.

We recommend you mount it with a rigid backing or frame so it stands up on the provided easel, with a maximum size no greater than 25 by 16 inches. If traveling by air, please make sure to consider luggage size. The display should include a title of the piece, artists / affiliations and brief explanation (a few sentences). Voting will be by Title, so please try to use a concise and catchy title. Similar to what one would see in an art gallery, the quality of printing, use of border, frames, 3D effects, etc., can significantly enhance the visual and professional appeal of your artwork.

You are expected to set up your display at the meeting site at the start of the conference and remove it by the end of the meeting. We will provide easels for your art displays. Contact Sandra Olson if you have any questions.

The ASGSR cannot guarantee the security of your artwork while on display at the hotel. Submission indicates your permission for your artwork to be displayed on the ASGSR website.

Each registered attendee will receive an art ballot as part of the registration package. The peer voting will occur throughout the conference until 3 PM Saturday. We plan to announce the winners before at the banquet that evening. We encourage you to submit an entry and look forward to a very successful event.



JOURNAL COMMITTEE

Chair: Dr. Jamie Foster

The Journal Committee prepares and solicits articles relevant to ASGSR interests for ASGSR publications and other journals, including international publications, as well as providing technical reviewers upon request. The journal committee supports outreach activities that promote the advancement of gravitational and space.

At minimum, the Journal Committee should annually:
• Solicit input and assemble the articles for ASGSR publications, including the ASGSR refereed journal.
• Provide an editor(s) for ASGSR publications.
• Promote the Society's publications, including providing access to the publications for Society members through the website. • Provide guidance with regards to the evolution of ASGSR publications.
• Facilitate the promotion of ASGSR authored articles to the general public and lay press.
• Provide input for the ASGSR newsletter and website.

EDUCATION AND OUTREACH COMMITTEE

Chair:

If creating educational opportunities for emerging scientists is your interest, consider joining this committee. The Education and Outreach Committee promotes and conducts education activities (student poster and design competitions) and can develop specific projects to increase knowledge and awareness of gravitational space and research throughout ASGSR sponsored public and professional forums. Annually, ASGSR supports the Graduate and Undergraduate Student Poster Competition at the annual meeting. This committee would be responsible for coordination and administration of the competition.

At minimum, the Education and Outreach Committee should annually:
• Coordinate participation in the ASGSR student poster competition including promoting event and recruiting student competitors.
• Organize and select judges for the ASGSR student poster competition. The student poster competition includes cash awards that are pre-determined annually.
• Update slide sets on ASGSR Web site.
• Develop and coordinate outreach event(s) for the annual meeting. (e.g., high school participation)

EXTERNAL AFFAIRS COMMITTEE

Chair:

The External Affairs committee is responsible for organizing the ASGSR's involvement with key policy makers and other professional organizations that promote ASGSR's positions and key issues. The committee, with coordination by the ASGSR board and executive director, develops key messaging for the society. The messaging can be short-term and long-term (i.e., strategic). This committee provides assistance in updating and publishing educational materials used for policy makers and will coordinate with other organizations (e.g., AIAA) to establish cooperation, keeping in mind future plans of jointly held sessions and workshops at ASGSR conferences. This committee will also be active in inviting state and local ASGSR members to key meetings.

At minimum, the External Affairs Committee should annually:
• Prepare and organize ASGSR positions and key issues with coordination and approval by the ASGSR board and executive director. • Coordinate development of position papers (also a role for the Communications Committee).
• Facilitate collaboration with other organizations.
• Coordinate appropriate activities with ASGSR local, regional, and student members.

MEETINGS AND WORKSHOPS COMMITTEE

Chair: Dr. David Urban

Do you have new ideas for workshops, sessions or symposiums for the 2017 meeting? If so, we encourage you to participate with the meetings and workshops committee. The Meetings and Workshops Committee is responsible for assisting the conference chair in organizing technical sessions for the ASGSR annual meeting. The ASGSR past president serves as the Program Chair for the Annual Meeting. Each year, this committee will work with Program Chair to identify the technical program. The committee will also work with the ASGSR board of governors to identify candidate geographic locations for the annual meeting. The committee also identifies other venues for ASGSR technical participation, such as the AIAA Aerospace Sciences Meeting (ASM), ELGRA, and ISGP. If other venues are identified, the committee submits a short proposal to the ASGSR board of directors, and executive director for approval, especially if there is an anticipated expenditure of funds. The committee will coordinate with other conference committees for joint sponsored conferences, co-located meetings, and workshops. At minimum, the Meetings and Workshops Committee should annually:

• Assist the Program Chair in organizing technical sessions for the ASGSR annual meeting
• Seek and coordinate joint venue activities at other conferences (e.g., ASM, ELGRA, ISGP) that promote gravitational and space research.

MEMBERSHIP/COMMUNICATIONS COMMITTEE

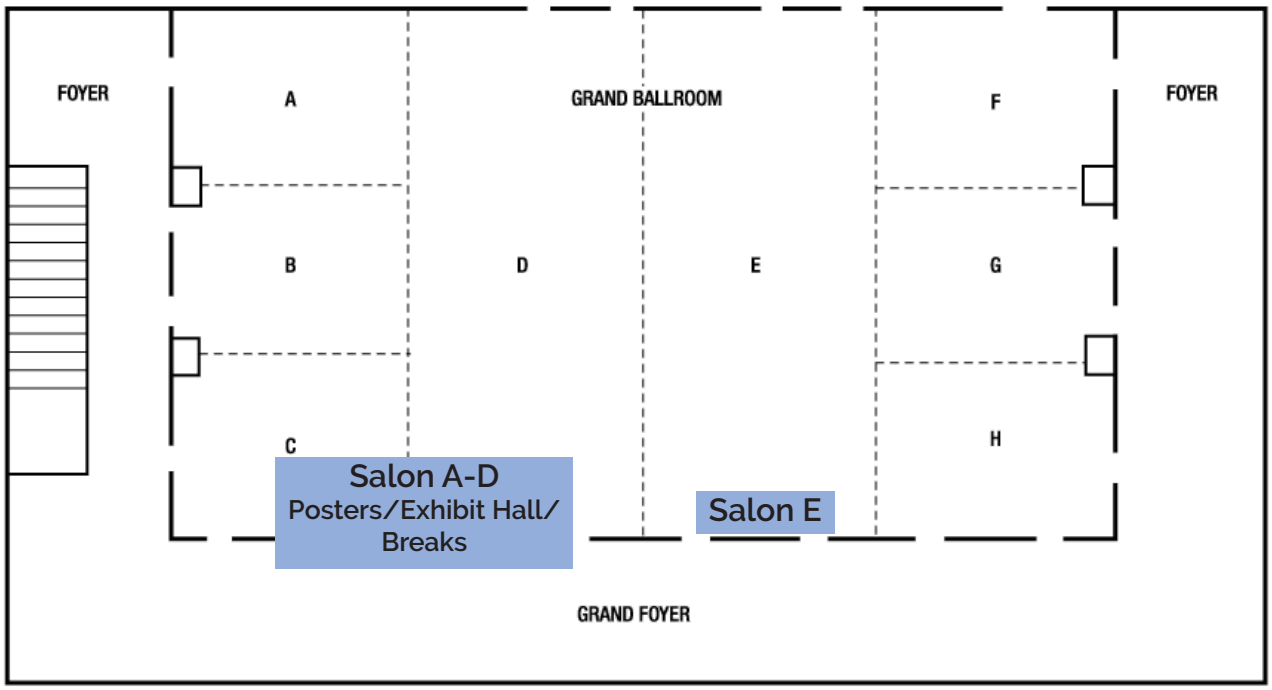
Chair: Dr. Kevin Sato

The Membership/Communications Committee recruits qualified new individuals who wish to promote gravitational and space biology and related technology development. Overall, the committee works to enhance ASGSR membership, working closely with the executive admin- istrator, who maintains the membership database. The committee will work to keep balanced membership across organizations and fields of expertise and ensure that current members remain sufficiently active in ASGSR. In addition to planning recruitment of new members, the committee will develop and implement a plan to re-engage past members.

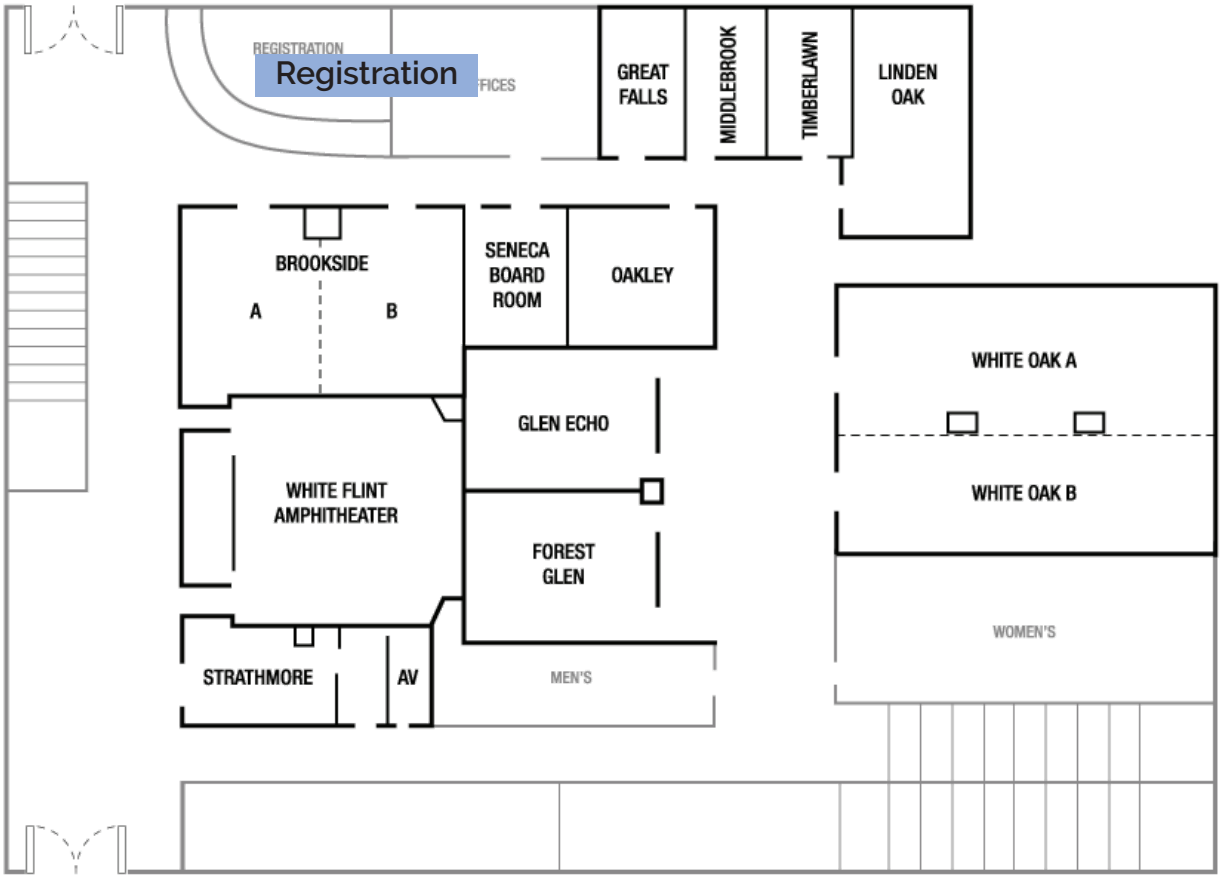
Furthermore, the committee supports outreach activities that promote the advancement of gravitational and space biology. The committee also assists in the publication of the ASGSR quarterly newsletter. This committee can also coordinate the development of position or white papers (also a role for the external affairs committee). The ASGSR Web site will be monitored by the committee, with a member(s) designat- ed as content manager.

At minimum, the Membership/Communications Committee should annually:
• Monitor member participation (meetings, voting and committee membership).
• Recruit new members (including international and student members) and follow up with welcome letters and information.
• Work with the Nominating Committee (standing committee) to identify candidates for the board of directors and president-elect.
• Solicit input and assemble the articles for ASGSR website and newsletter.
• Promote the Society's publications, including providing access to the publications for Society members through the website.
• Annually update and prepare the ASGSR membership-marketing brochure and make it available to membership committee and members to distribute at appropriate events.
• Provide content updates for the ASGSR Web site as needed.
• Assist in the publication of the ASGSR newsletter.
• Facilitate the promotion of ASGSR authored articles to the general public and lay press.

MAIN LEVEL



LOWER LEVEL



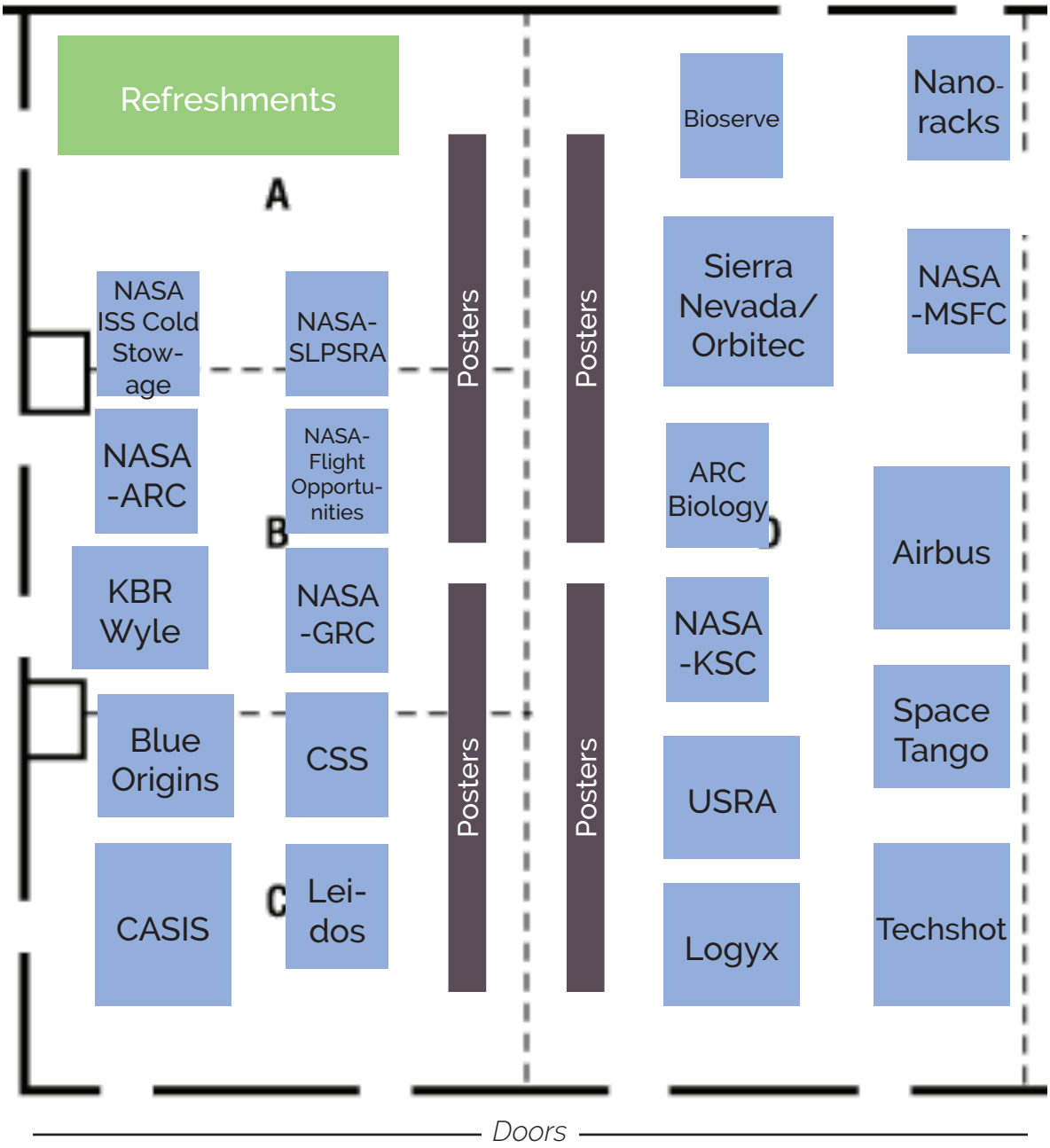
2018 ASGSR Exhibitors

The following exhibitors will be showcased throughout the week in Salon A-D:

CASIS
Techshot
Sierra Nevada/Orbitec
Logyx
USRA
KBRWyle
Leidos

Airbus
Bioserve
Nanoracks
Space Tango
Blue Origins
NASA ISS Cold Stowage
CSS

NASA Flight Opportunites
NASA-GRC
NASA-MSFC
NASA-ARC
NASA-KSC
NASA-SLPSRA
ARC Biology



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