

Committee on Biological and Physical Sciences in Space (CBPSS)

Committee

Robert W. Hyers

Co-Chair

ROBERT W. HYERS is a George I. Alden Professor and head, Department of Mechanical & Materials Engineering, Worcester Polytechnic Institute and a principal scientist and owner of RHA Materials, LLC, which offers contract research and consulting on materials processing and properties to the government and academic institutions as well as private businesses. Previously, Hyers was Professor at the University of Massachusetts, Amherst, president and chief technology officer of the Boston Electrometallurgical Corporation, and a staff scientist at NASA Marshall Space Flight Center/Electrostatic Levitation Lab. Hyers' research includes high-temperature materials, condition monitoring and prognosis of structures, and physics-based modeling of materials processing and failure. Hyers holds several patents for materials processing. Hyers earned a PhD in materials engineering from the Massachusetts Institute of Technology. Hyers's previous National Academies service includes the Decadal Survey on Biological and Physical Sciences Research in Space 2023-2032 (steering committee).

Martha H. Vitaterna

Co-Chair

MARTHA H. VITATERNA is a research professor and deputy director of the Center for Sleep and Circadian Biology at Northwestern University. Vitaterna's research focuses on the genetics of mammalian circadian rhythms and sleep, primarily in mice. Vitaterna discovered the Clock mutant mouse leading to the identification of the first mammalian circadian clock gene, has carried out studies demonstrating the functional significance of the clock genes Cry1 and Cry2, and used quantitative and systems analyses as well as examination of the contributions of bacterial genomes (the microbiome). Vitaterna is particularly interested in using genetic/genomic/microbiome analyses to understand the interplay between sleep, circadian rhythms, and stress, including both Earth-based and spaceflight-associated stressors. Vitaterna has participated in two NASA flight studies, the NASA Twins study and the Rodent Research 7 study. Vitaterna earned a PhD in neurobiology and physiology from Northwestern University. Vitaterna's previous National Academies service includes the Decadal Survey on Biological and Physical Sciences Research in Space 2023-2032 (biological sciences panel).

Debjyoti Banerjee

Member

DEBJYOTI BANERJEE is a professor of mechanical engineering and a faculty fellow at the Mary Kay O'Connor Process Safety Center at Texas A&M University. Previously, Banerjee was the manager of the Fluidics and Device Engineering Group in the Advanced Research and Technology Division at Applied Biosystems Inc./Applera Corporation (currently called Life Technologies). Research interests involve thermal-fluids sciences with emphasis on multi-phase flows (boiling, condensation), microelectromechanical systems (MEMS, including radio-frequency-MEMS, optical-MEMS, and bio-MEMS), micro/nano-fluidics, bio-nanotechnology (Dip-Pen nanolithography, nanofabrication, nanosynthesis, explosives sensing for detection of improvised explosive devices using nano-calorimetry), and renewable energy technologies (using nanofluids for solar thermal energy storage and power conversion). Banerjee earned a PhD in mechanical engineering from the University of California, Los Angeles. Banerjee's previous National Academies service includes the Decadal Survey on Biological and Physical Sciences Research in Space 2023-2032 (steering committee and physical sciences panel).

Joan Wennstrom Bennett

Member

JOAN W. BENNETT is the Ida Richardson Chair of Botany at Tulane University, New Orleans, Louisiana. Bennett's research has focused on the toxicology of filamentous fungi, organisms whose toxicological potential is understood best in the context of dietary exposure to mycotoxins. However, toxic molds also have been implicated as contributing to a poorly understood environmental disease usually called "sick building syndrome" where respiratory and dermal exposure to mold toxins, structural components, volatile organic compounds and other metabolites have been associated with an array of non-specific symptoms. Previously, Bennett served as an associate vice president for Women in Science, Engineering and Mathematics and a Distinguished Professor of Biochemistry and Microbiology at Rutgers University. Bennett is past-vice president of the British Mycological Society and the International Union of Microbiological Sciences as well as past-president of the American Society for Microbiology and the Society of Industrial Microbiology and Biotechnology. Bennett is a member of the National Academy of Sciences and the American Academy of Arts and Sciences. Bennett earned a PhD in botany and genetics from the University of Chicago.

Yu-Chien Chien

Member

YU-CHIEN (ALICE) CHIEN is director of the Lasers, Flames & Aerosols Research Group and project scientist in the W.M. Keck Foundation Deep Ocean Power Science Lab in the Mechanical and Aerospace Engineering department at the University of California, Irvine. Chien's research interests include energy/combustion control and measurement and greenhouse gas mitigation, specifically electric field control of flames in microgravity, gas hydrates research in combustion and emission, fire extinguishment, storage and sequestration, aerosols and spray holographic imaging, and optical diagnostics techniques. Chien served in real time ISS remote operations on Earth for the E-FIELD Flames experiment with the NASA GRC. Chien has received the Thora Halstead Young Investigator award from the American Society for Gravitational and Space Research (ASGSR). Chien is an active member in the ASGSR, Society of Women Engineers, Combustion Institute, and American Institute of Aeronautics and Astronautics. Chien earned a PhD in mechanical and aerospace engineering from the University of California, Irvine.

Dennis E. Discher

Member

DENNIS E. DISCHER (NAE/NAM) is the Robert D. Bent Professor at the University of Pennsylvania (Penn) and director of a National Cancer Institute (NCI)-funded Physical Sciences Oncology Center/Project at Penn. Discher's laboratory generally takes soft matter biophysics and mechanobiology approaches to basic and applied questions across molecular, cell, and tissue scales. Discher is an elected member of the National Academy of Medicine, the National Academy of Engineering, and the American Association for the Advancement of Science. Discher has received the Shu Chien Award from the Biomedical Engineering Society and the Bessel Award from the Alexander von Humboldt Foundation in Germany. Discher earned a Ph.D. in bioengineering from the University of California (UC) Berkeley and UC San Francisco. Discher's previous National Academies service includes the Planning Committee on Understanding the Rules of Life Program.

Jay Lemery

Member

JAY LEMERY is the Climate & Health Foundation Endowed Chair in Climate Medicine and Professor of Emergency Medicine at the University of Colorado (CU) School of Medicine, chief of the Section of Wilderness and Environmental Medicine, and faculty in the Department of Environmental and Occupational Health at the Colorado School of Public Health. Lemery has expertise in austere and remote medical care, as well as the effects of climate change on human health. At CU, Lemery co-founded and directs the Climate & Health Program based at the School of Medicine. Lemery's CU-based research lab, the Cryosphere Austere Medicine Platform, is a Department of Defense-funded platform that studies human and material performance in extreme cold environments. Lemery has worked with the CDC, the National Science Foundation and NASA on research of care delivery in extreme environments. Lemery is a member of the National Academy of Medicine and the Council on Foreign Relations and a past-president of The Wilderness Medical Society. Lemery earned an MD from the Dartmouth Geisel School of Medicine and is board certified in Emergency Medicine.

Anna-Lisa Paul

Member

ANNA-LISA PAUL is the director of the Interdisciplinary Center for Biotechnology Research (ICBR) at the University of Florida and a research professor in the department of Horticultural Sciences, program of Plant Molecular and Cellular Biology. Paul's research is focused on plant gene expression in response to spaceflight and planetary analogs, with terrestrial research in planetary exploration including analog work in Antarctica and the Canadian Arctic, and with true lunar materials (genomic responses of Arabidopsis to growth in lunar regolith from Apollo 11, 12 and 17). Paul has served the space research community as president of the American Society for Gravitational and Space Research (ASGSR), as a member of the ISS Standing Review Board, on NASA's GeneLab Science Council, and on an advisory board for the Commercial Spaceflight Federation. Paul is a recipient of the NASA Medal of Honor for Exceptional Scientific Achievement and a fellow of ASGSR. Paul earned a Ph.D. in plant molecular genetics from the University of Florida.

Jan R. Rogers

Member

JAN R. ROGERS recently retired from NASA's Marshall Space Flight Center as a senior technical staff member. Rogers served as a staff member implementing, formulating, and managing technology and scientific research and development in support of NASA's materials science interests. In particular, Rogers implemented, initiated, and led independent projects and efforts for scientific research, technology developments for use on Earth and in reduced gravity. Rogers' program management experience includes content formulation and performance assessments in the Space Technology Mission Directorate's Space Technology Research Grants Program and technical leadership for the implementation of the materials science and biophysics portfolio for the Science Mission Directorate's Space Life and Physical Sciences Program for experiments on the International Space Station (ISS). Rogers has been recognized with multiple NASA awards, including the Silver Snoopy Award for exceptional contributions to mission success for experiments on SpaceLab, an Exceptional Achievement Award for levitation technology development efforts, and two Silver Achievement Medals for contributions as part of ISS MaterialsLab Teams and Group Achievement Awards, including one for Business Development. Rogers earned a PhD in chemical engineering from the University of Colorado, Boulder.

Álvaro Romero-Calvo

Member

ÁLVARO ROMERO-CALVO is an assistant professor in the Daniel Guggenheim School of Aerospace Engineering at Georgia Tech, leading the Low-Gravity Science and Technology Laboratory. Romero-Calvo's group engages in a broad range of activities in the fields of microgravity and low-gravity research, supporting the development of next-generation space systems and the study of the fundamental physical phenomena behind them. As PI and Co-PI of multiple federal and industry-funded projects, Romero-Calvo's research has advanced new phase separation, propellant management, life support, adaptive optics, lunar surface, and heat transfer technologies. Romero-Calvo is a NASA Innovative Advanced Concepts Fellow and has received the American Society for Gravitational and Space Research (ASGSR) Thora Halstead Young Investigator Award. Other recognition includes media coverage in Popular Science, Science News, Physics Today, and other international outlets. Romero-Calvo serves as chair of the American Institute of Aeronautics and Astronautics' Gravity-Dependent Science and Technology Technical Committee and vice-chair of Committee on Space Research's Commission G, and has recently completed a three-year rotation as a member of the governing board of ASGSR. Romero-Calvo earned a PhD in aerospace engineering sciences from the University of Colorado, Boulder.

Kathleen Rubins

Member

KATHLEEN RUBINS is a professor in the School of Medicine and inaugural director of the Trivedi Institute for Space and Global Biomedicine at the University of Pittsburgh. Rubins is a world-renowned expert in molecular and cellular biology for use in low-Earth orbit and low-resource environments. As a NASA astronaut, Rubins led the development of molecular techniques for human health in space and served as Deputy Director for NASA Health and Human Performance. Rubins' 300 days on the International Space Station included four spacewalks, the first DNA sequencing in space, and microgravity research on cardiomyocytes, organoids, and synthetic biology. Rubins is a Major in the Army Reserve and regularly collaborates across government agencies. At Stanford University, Rubins co-developed the first smallpox animal model and genomic tools for high-consequence viral diseases. At the Massachusetts Institute of Technology, Rubins mapped the poxvirus transcriptome and led fieldwork in the Democratic Republic of Congo. Rubins is a fellow of the National Academy of Medicine with honors including the U.S. Army Basic Aviation Badge with the Astronaut Device and the Basic Space Badge, and Popular Science's Brilliant Ten. Rubins earned a PhD in cancer biology from Stanford University.

Kenneth A. Savin

Member

KENNETH A. SAVIN is the Chief Scientific Officer at BioOrbit. Previously, Savin was the Chief Scientific Officer at Redwire. Savin's focus at Redwire was on the commercialization of work performed in the labs at Redwire and partnership development. Prior to Redwire, Savin worked in business development at the Center for the Advancement of Science in Space (CASIS), serving as a science lead and ultimately as the senior director of in space production applications. In the latter role, Savin worked with a team at NASA to develop the In Space Production and Applications program that is run out of NASA as an effort to develop products in space that will benefit life on the Earth. Before CASIS, Savin was a senior research scientist at Eli Lilly and Co., leading an effort that resulted in five separate flight experiments flown on the International Space Station. Savin was selected as one of Time Magazine's 100 Most Influential People Health Leaders for 2025. Savin earned a PhD in synthetic organic chemistry from the University of Utah.

Clayton E. Simien

Member

CLAYTON E. SIMIEN is an associate professor at University of Alabama at Birmingham. Simien's research focuses on areas of precision spectroscopy as it relates to precision measurements, next generation frequency standards, ultracold atoms and plasmas, quantum information and computation, and nanotechnology. Previously, Simien was National Research Council Postdoctoral Fellow at the National Institute of Standards and Technology, where Simien performed precision spectroscopy using an optical frequency comb to test quantum-electrodynamic calculations of many-body atomic systems. Simien is a recipient of the National Science Foundation CAREER Award in Atomic, Molecular, and Optical Physics and has served on the American Physical Society's Committee on Minorities in Physics. Simien is also an active member of the National Society of Black Physicists. Simien earned a Ph.D. in physics from Rice University.

Liz Warren

Member

LIZ WARREN is the International Space Station program's Associate Chief Scientist at The Aerospace Corporation, with expertise in the effects of spaceflight on human physiology and microgravity sciences. Warren has performed a variety of spaceflight research roles; as an operations lead for human research, managing biological and physical sciences research for the ISS National Laboratory as a senior program director at the Center for the Advancement of Science in Space, and as the Chief Scientist for NASA's Human Health and Performance contract. Warren has extensive involvement with spaceflight research, including space shuttle missions, the Mir space station, the International Space Station, and the Orbital Reef commercial space station. Warren is the recipient of NASA's Exceptional Public Achievement Medal. Warren earned a Ph.D. in molecular, cellular and integrative physiology from the University of California, Davis.

Deborah S. Wells

Member

DEBORAH (DEBBIE) S. WELLS is the vice president for space exploration and mission operations at Leidos, Inc. In this role, Wells oversees Leidos's portfolio of end-to-end space services enabling success for NASA's International Space Station and Artemis missions as well as the commercial space marketplace. Previously, Wells led multiple laboratories supporting Kennedy Space Center's (KSC) operations, research, and technology development. As a biomedical engineer, Wells has contributed to scientific health and wellness experiments aboard over 100 space shuttle missions and has served as Life Sciences Services Contract lead for the development of KSC and Armstrong Flight Research Center facilities for astronaut research and the design, construction, and start-up of the Space Life Sciences Lab – the first facility in Space Florida's Exploration Park. Wells has also served as director of product development at a renewable energy start-up with responsibility for recommending and implementing both manufacturing and business strategies for products in animal feed, fertilizer, fuels, and human food. Recognitions include Space Coast Women Engineer of the Year and NASA's Silver Snoopy. Wells earned an MBA. from the University of Florida. Wells served on. Wells' previous National Academies service includes the Decadal Survey on Biological and Physical Sciences Research in Space 2023-2032 (engineering and science interface panel) and the Engineering and Science Panel for the NAE Decadal Survey for Biology and Physical Sciences).