

Space Nuclear Propulsion Technologies

Committee

Robert D. Braun

Co-Chair

ROBERT D. BRAUN (NAE) is the director for planetary science at the Jet Propulsion Laboratory, California Institute of Technology where he has leadership and management responsibility for the portfolio of planetary science formulation, technology, implementation and operations activities at the Lab. Prior to this role, he was dean of the College of Engineering and Applied Science at the University of Colorado Boulder. In 2010 and 2011, as the NASA chief technologist, he served as the Agency's senior executive for technology policy and programs. Formerly, he was a faculty member at the Georgia Institute of Technology (Georgia Tech) where he led a research and education program focused on the design of advanced flight systems and technologies for planetary exploration. Prior to joining the Georgia Tech faculty, Dr. Braun worked for 16 years at the NASA Langley Research Center. While at NASA, he contributed to the design and flight operations of multiple spaceflight projects including the Mars Pathfinder mission. Dr. Braun is a fellow of the American Institute of Aeronautics and Astronautics and the American Astronautical Society, and the author or co-author of more than 300 technical publications in the fields of atmospheric flight dynamics, planetary exploration systems, multidisciplinary design optimization and systems engineering. He received his Ph.D. in aeronautics and astronautics at Stanford University. He has previously served on several National Academies committees and as vice chair of the Space Studies Board.

Roger M. Myers

Co-Chair

ROGER M. MYERS is the owner of R. Myers Consulting. He is a senior aerospace consultant with more than 30 years of experience in space technology development, flight programs, and in-space mission architecture planning. He currently provides expertise in space propulsion and power systems (both conventional and nuclear), program management, and strategic planning to multiple clients. He retired from Aerojet Rocketdyne, where his most recent position was executive director of Advanced In-Space Programs. In that role, he oversaw programs and strategic planning for next-generation in-space missions and architectures, propulsion systems, power systems, and space vehicles for the Department of Defense, NASA, and the commercial sector. These included nuclear thermal propulsion and nuclear electric power systems in addition to chemical and non-nuclear electric propulsion systems. He also served as Aerojet Rocketdyne's executive director of electric propulsion and integrated systems, where he led efforts focused on the development and production of next-generation chemical and electric space propulsion systems and vehicles. Dr. Myers has also served as deputy lead of Aerojet Rocketdyne's Space and Launch Systems and general manager of Redmond Operations. Prior to joining Aerojet Rocketdyne, Myers held supervisory and research positions at NASA's Glenn Research Center, conducting research for the On-Board Propulsion Branch. He has authored more than 80 publications on spacecraft propulsion and advanced mission architectures, he is a former chair of the AIAA Electric Propulsion Technical Committee, and he is a former associate editor of the Journal of Propulsion and Power. Dr. Myers is past-president of the Electric Rocket Propulsion Society (ERPS), the president-elect of the Washington State Academy of Sciences, the chair of the Washington State Joint Center for Aerospace Technology Innovation, and a member of the board of directors of the ERPS and Seattle's Museum of Flight. He is a fellow of the AIAA and has received the AIAA Wyld Propulsion Award and the Stuhlinger Medal for Outstanding Achievement in Electric Propulsion. He holds a Ph.D. in mechanical and aerospace engineering from Princeton University. He has previously served on several National Academies committee.

Shannon Bragg-Sitton

Member

SHANNON BRAGG-SITTON is the lead for integrated energy systems in the Nuclear Science and Technology Directorate at the Idaho National Laboratory (INL), Battelle Energy Alliance. In this role, Dr. Bragg-Sitton serves as the co-director for the INL Laboratory Initiative on Integrated Energy Systems (IES), which includes focus areas for thermal energy generation, power systems, data systems, and chemical processes and industrial applications. Shannon also serves as the INL lead for the Department of Energy (DOE) Applied Energy Tri-Laboratory Consortium, which includes INL, the National Renewable Energy Laboratory, and the National Energy Technology Laboratory. Dr. Bragg-Sitton has held multiple leadership roles in DOE Office of Nuclear Energy (DOE-NE) programs since joining INL. She currently serves as the national technical director for the DOE-NE IES program within Crosscutting Technologies Development. Prior to joining INL, Dr. Bragg-Sitton was an assistant professor in the Nuclear Engineering Department at Texas A&M University and a technical staff member at Los Alamos National Laboratory, during which time she was on assignment at NASA Marshall Space Flight Center. In each of these capacities, her primary research area was in-space nuclear power and propulsion systems, including system design, analysis, and testing for nuclear electric and nuclear thermal propulsion and nuclear surface power for applications on the Moon or Mars. Dr. Bragg-Sitton also led fuel development work for nuclear thermal propulsion while at INL. She holds a Ph.D. in nuclear engineering from the University of Michigan. She has not previously served on a National Academies committee.

Jonathan W. Cirtain

Member

JONATHAN W. CIRTAIN is the president of Advanced Technologies, LLC, a subsidiary of BWX Technologies (BWXT), which is the sole manufacturer of nuclear reactors for the U.S. Navy. Previously, Dr. Cirtain was the director of the Transformational Challenge Reactor program at the Department of Energy (DOE) Oak Ridge National Laboratory. This was a demonstration program to design and manufacture a high-temperature gas reactor using 3-D manufacturing and artificial intelligence systems. Dr. Cirtain has also served as manager of the Science Office at NASA Marshall Space Flight Center. At BWXT, Dr. Cirtain leads the development of advanced reactor programs for various government and commercial customers, as well as novel radiopharmaceutical product development and manufacturing. Dr. Cirtain has received numerous awards including the Presidential Early Career Award for Scientists and Engineers, the NASA Exceptional Achievement Award, and the NASA Exceptional Science Achievement Award. He received his Ph.D. in physics from Montana State University. He has not previously served on a National Academies committee.

Tabitha Dodson

Member

TABITHA DODSON is an engineer-scientist, SETA with Gryphon-Schafer Government Services, LLC. She is also the chief engineer of the Demonstration Rocket for Agile Cislunar Operations (DRACO) program at the Defense Advanced Research Projects Agency (DARPA) that is developing a nuclear thermal propulsion system. Previously, Dr. Dodson was an adjunct professor in the Aeronautics and Astronautics Department of the Air Force Institute of Technology (AFIT). Dr. Dodson has worked in various positions within the U.S. Air Force, including aerospace engineer and senior scientist, in the fields of spacecraft engineering, space power, and space propulsion. Her research interests and experiences include nuclear thermal propulsion fuels development; advanced space propulsion; and nuclear, quantum, and plasma physics and plasma engineering. She has a Ph.D. in applied physics from the Air Force Institute of Technology and a Ph.D. in mechanical and aerospace engineering from the George Washington University. She has not previously served on a National Academies committee.

Alec D. Gallimore

Member

ALEC D. GALLIMORE (NAE) is the Robert J. Vlasic Dean of Engineering, the Richard F. and Eleanor A. Towner Professor of Engineering, and an Arthur F. Thurnau Professor in the Department of Aerospace Engineering at the University of Michigan (UM), where he is founder and co-director of the Plasmadynamics and Electric Propulsion Laboratory. Previously, Dr. Gallimore served as associate dean for academic affairs and associate dean for research and graduate education at the UM College of Engineering and as associate dean at the Horace H. Rackham School of Graduate Studies. His primary research interests include electric propulsion and plasma diagnostics. He has experience with a wide array of electric propulsion technologies including Hall thrusters, ion thrusters, arcjets, radiofrequency plasma sources, 100-kW-class steady magnetoplasmadynamic (MPD) thrusters, and megawatt-level quasi-steady MPD thrusters. Gallimore has implemented a variety of probe, microwave, and optical/laser plasma diagnostics. He has served on advisory boards for NASA and the Department of Defense, including the U.S. Air Force Scientific Advisory Board. He was awarded the Decoration for Meritorious Civilian Service by the U.S. Air Force and is a fellow of the AIAA. He has a Ph.D. in aerospace engineering from Princeton University. He has previously served on several National Academies committee.

James H. Gilland

Member

JAMES H. GILLAND is a senior scientist at the Ohio Aerospace Institute and has worked there for 19 years. Dr. Gilland has performed and led mission and system studies for solar and nuclear electric propulsion systems, and he has performed research in high-power electric propulsion thruster concepts, including magnetoplasmadynamic thrusters, Hall thrusters, and innovative wave heated concepts. Dr. Gilland is a fellow of the NASA Institute for Advanced Concepts and an associate fellow of the AIAA. He received his Ph.D in nuclear engineering and engineering physics from the University of Wisconsin-Madison. He has not previously served on a National Academies committee.

Bhavya Lal

Member

BHAVYA LAL leads the space technology and policy portfolio at the IDA Science and Technology Policy Institute (STPI). She has applied her expertise in engineering systems and innovation theory and practice to topics in space, with recent projects on commercial activities in low-Earth orbit and deep space, on-orbit servicing assembly and manufacturing, human exploration, space nuclear power, and space science. Before joining STPI, Dr. Lal was president of C-STPS, LLC, a science and technology policy research and consulting firm in Waltham, Massachusetts. Prior to that, she was a researcher at and the Director of the Center for Science and Technology Policy Studies at Abt Associates, Inc., in Cambridge, Massachusetts. Dr. Lal holds bachelor's and master's degrees in nuclear engineering from the Massachusetts Institute of Technology, and a Ph.D. in public policy and public administration from George Washington University. She has previously served on several National Academies committee.

Parviz Moin

Member

PARVIZ MOIN (NAS/NAE) is the Franklin P. and Caroline M. Johnson Professor of Mechanical Engineering and the director of the Center for Turbulence Research (CTR) at Stanford University. Established in 1987, CTR is devoted to fundamental studies of multi-physics turbulent flows and is widely recognized as the international focal point for turbulence research, attracting diverse groups of researchers from engineering, mathematics, and physics. Dr. Moin pioneered the use of direct numerical simulation and large eddy simulation techniques for the study of turbulence physics, control, and modeling of fluid mechanics, and he has written widely on the structure of turbulent shear flows. His current research interests include hypersonic flows, two-phase flows, aerodynamic noise, hydro-acoustics, aero-optics, propulsion, numerical methods for multi-scale problems, and flow control. Dr. Moin is the co-editor of the Annual Review of Fluid Mechanics and associate editor of the Journal of Computational Physics. He is the recipient of the NASA Exceptional Scientific Achievement Medal, the AIAA Lawrence Sperry Award, American Physical Society (APS) Fluid Dynamics Prize, AIAA Fluid Dynamics Award, and NASA Outstanding Leadership Medal. Dr. Moin is a member of the Royal Spanish Academy of Engineering. He is a fellow of the APS, AIAA, and the American Academy of Arts and Sciences. Dr. Moin received a Ph.D. in mechanical engineering from Stanford University. He has previously served on several National Academies committees.

Joseph A. Sholtis, Jr.

Member

JOSEPH A. SHOLTIS, JR. is the owner and principal of Sholtis Engineering & Safety Consulting, providing expert nuclear, aerospace, and systems engineering services to government, national laboratories, industry, and academia since 1993. Prior to that, he retired from the U.S. Air Force as a lieutenant colonel, having spent 22 years as a nuclear research officer and a system development program manager spearheading a wide variety of advanced nuclear technologies and systems for space, missile, and unique terrestrial applications. Mr. Sholtis is an expert in space nuclear systems, their safety and reliability, and the risks associated with their launch and use in space. He has been involved in the design and development of U.S. space reactor and radioisotope power systems (RPS), including conception and advancement of particle based fuels and fuel forms to enhance the design, performance, and safety of future RPS. He has participated in launch safety and mission risk analyses and evaluations of 15 U.S. nuclear-powered or nuclear-heated space missions; served as program manager of the SP-100 space reactor program; advised the U.S. delegation to the United Nations Committee on the Peaceful Uses of Outer Space (in particular, the Working Group on Nuclear Power Sources for Space); and served on NASA's Nuclear Safety Policy Working Group on Nuclear Propulsion for the Space Exploration Initiative and on NASA's Nuclear Power Assessment Study. He is an associate fellow of the AIAA, a member of the AIAA Aerospace Power Systems Technical Committee (leading a team developing an AIAA White Paper on U.S. Space Nuclear Power Systems), and an emeritus member of the American Nuclear Society (ANSWER) and the ANS Trinity Section. He has authored more than 100 technical publications, including chapters in four textbooks, and has received numerous awards and citations from the Department of Defense, U.S. Air Force, U.S. Army, DOE, Sandia National Laboratories, NASA, Jet Propulsion Laboratory, and the White House. He has previously served on a National Academies committee.

Steven J. Zinkle

Member

STEVEN J. ZINKLE (NAE) is the Governor's Chair Professor for Nuclear Materials in the Departments of Nuclear Engineering and Materials Science and Engineering at the University of Tennessee at Knoxville. Previously, he was chief scientist for the DOE Oak Ridge National Laboratory's (ORNL) Nuclear Science & Engineering Directorate and director of ORNL's Materials Science and Technology Division. Dr. Zinkle's research encompasses physical metallurgy and advanced manufacturing of structural materials and the investigation of radiation effects in ceramics and metallic alloys for fusion and fission energy systems. He received a Ph.D. in nuclear engineering from the University of Wisconsin-Madison. He has previously served on several National Academies committees.