Prospects for Inertial Confinement Fusion Energy Systems

Committee

Ronald C. Davidson

Co-Chair

Ronald C. Davidson has been Professor of Astrophysical Sciences at Princeton University since 1991, and was Director of the Princeton Plasma Physics Laboratory from 1991-1996. He received his B.Sc. degree from McMaster University in 1963 and his Ph.D. degree from Princeton University in 1966. He was Assistant Research Physicist at the University of California at Berkeley from 1966-1968, an Assistant Professor of Physics at the University of Maryland from 1968-1971, an Alfred P. Sloan Foundation Fellow from 1970-1972, an Associate Professor of Physics from 1971-1973, a Professor of Physics at the University of Maryland from 1973-1978, and a Professor of Physics at the Massachusetts Institute of Technology from 1978-1991. Dr. Davidson has made numerous fundamental theoretical contributions to several areas of pure and applied plasma physics, including nonneutral plasmas, nonlinear effects and anomalous transport, kinetic equilibrium and stability properties, intense charged particle beams, advanced accelerator concepts, and coherent radiation generation by relativistic electron beams. He is the author of more than 250 journal articles and books, including three advanced research monographs: "Methods in Nonlinear Plasma Theory" (Academic Press, New York, 1972), "Theory of Nonneutral Plasmas" (W.A. Benjamin, Reading, Massachusetts, 1974, reissued in Addison-Wesley Advanced Book Classics Series, 1989), and "Physics of Nonneutral Plasmas" (Addison-Wesley, Reading, Massachusetts, 1990). During 1976-1978 he served as Assistant Director for Applied Plasma Physics, Office of Fusion Energy, Department of Energy. Dr. Davidson also served as Director of the MIT Plasma Fusion Center from 1978-1988, as the first Chairman of the DOE Magnetic Fusion Advisory Committee (MFAC) from 1982-1986, as chairman of the American Physical Society Plasma Physics Division during 1983-1984, and has participated in numerous national and international committees on plasma physics and fusion research. Dr. Davidson is a Fellow of the American Physical Society, a Fellow of the American Association for the Advancement of Science, and a member of Sigma Xi. He is also a recipient of the Department of Energy Distinguished Associate Award and the Fusion Power Associates Leadership Award, both in 1986, and recipient of The Kaul Foundation's Award for Excellence in 1993.

Dr. Davidson has made numerous fundamental theoretical contributions to several areas of pure and applied plasma physics, including nonneutral plasmas, nonlinear effects and anomalous transport, kinetic equilibrium and stability properties, intense charged particle beams, advanced accelerator concepts, and coherent radiation generation by relativistic electrons.

Gerald L. Kulcinski

Co-Chair

Gerald L. Kulcinski, NAE, is currently the Grainger Professor of Nuclear Engineering and the Director of the Fusion Technology Institute at the University of Wisconsin-Madison. Dr. Kulcinski received his B.S. in Chemical Engineering in 1961 and his Ph.D. in Nuclear Engineering from the University of Wisconsin in 1965. His current research interests lie with the assessment of technological problems associated with the production of power from both controlled thermonuclear and fission reactors and with the specific problems of metals exposed to the intense radiation environment associated with fission and fusion reactors. He has published over 210 scientific articles in 33 different journals, over 270 additional reports and articles in conference proceedings and is a co-author or contributor to 4 books. Since 1969, Dr. Kulcinski has given over 215 invited lectures in the U.S. and 17 foreign countries.
He was elected to the National Academy of Engineering in 1993 and has been a fellow in the American Nuclear Society since 1978.

Professor Kulcinski conducted and directed research on the effects of radiation in metals while serving as a senior research scientist at the Battelle Northwest Laboratories from 1965 to 1971 and worked on the Nuclear Rocket Program at Los Alamos in 1963. From 1965 to 1971 he was a Lecturer at the Center for Graduate Study in Richland, Washington. Dr. Kulcinski joined the Nuclear Engineering Department at the University of Wisconsin in 1972. He was a visiting scientist at the Karlsruhe Nuclear Research Center in West Germany in 1977 and was on sabbatical leave at the Bechtel Corporation in San Francisco in 1989.

He has been a member of the American Nuclear Society since 1961, secretary of Richland, Washington section in 1970, past student advisor of the Wisconsin Chapter (1972-73), chairman of the second ANS topical meeting on fusion technology in 1976, and served on the Board of Directors from 1987-90. In 1978, he received the Curtis W. McGraw Research Award by the Engineering Research Committee of the American Association of Engineering Education. In 1980, he received the Outstanding Achievement Award from the Controlled Thermonuclear Division of the American Nuclear Society. He served on the Governor's Energy Policy Task Force for the State of Wisconsin in 1980, was a U.S. delegate to the International Tokamak Reactor (INTOR) Project in Vienna, Austria from 1979 to 1981, and was on the advisory panel for INTOR until 1987. In 1984 he was appointed to the Grainger Chair of Nuclear Engineering at the university. In 1987 he received the John Randle Grumman Achievement Award from the Grumman Aircraft Corporation. He was awarded the 1992 Leadership Award in Fusion by Fusion Power Associates. In 1993 he received the NASA Public Service Medal and was elected to Phi Kappa Phi. He is currently an Associate Editor of Fusion Engineering and Design. Dr. Kulcinski has served on several review panels for the National Academy of Sciences, the Department of Energy, Los Alamos National Laboratory, Sandia National Laboratory, and Argonne National Laboratory in the United States as well as for the Karlsruhe Nuclear Laboratory in Germany and the Ontario Hydroelectric Utility in Canada.

Charles Baker

Member

Charles Baker is currently a consultant to Sandia National Laboratories, in Albuquerque, New Mexico; in addition to serving as the chairman of US ITER Technology Advisory Committee. Dr. Baker received his Ph.D. in nuclear engineering in 1972 from the University of Wisconsin-Madison and has been involved in fusion energy research since that time. He was a fusion energy department manager at General Atomics from 1972 to 1977, director of Argonne National Laboratory's fusion program from 1977 to 1989, program director for fusion technology at Oak Ridge National Laboratory from 1989-1994, and head of US work on the International Thermonuclear Experimental Reactor from 1992 to 1999. From 1994 to 2004, he was at the University of California, San Diego, where he continued as head of the US ITER work and served as Deputy Director of UCSD's Center for Energy Research. From 1998 to 2005, he acted as the Director of DOE's Virtual Laboratory for Fusion Technology and as Adjunct Professor in UCSD's Mechanical & Aerospace Department. He currently serves as chair of the US ITER Technical Advisory Committee, as a member of the US ITER Project Board, and was a member of the US delegation to the international ITER Management Advisory Committee.

Dr. Baker's professional memberships and activities include: Fellow, American Nuclear Society; member, DOE Fusion Energy Sciences Advisory Committee (2002-2008); Principal Editor, Journal of Fusion Engineering & Design (2001-present); and Symposium General Chairperson, 6th International Symposium on Fusion Nuclear Technology (2002). He received the US Department of Energy's Distinguished Associate Award in 1988 and the University of Wisconsin College of Engineering Distinguished Service Award in 1993. He received the IEEE/NPSS Fusion Technology Award for 2004 and the Fusion Power Associate Award for Distinguished Career in 2005. Dr. Baker is a registered professional engineer (nuclear engineering) in California.

Roger Bangerter

Member

Roger Bangerter retired as the head of Fusion Energy Research at Lawrence Berkeley National Laboratory. In 1969 Dr. Bangerter received a Ph.D. in physics from the University of California at Berkeley where he specialized in elementary particle physics. His research has been in the area of heavy ion fusion. Prior to his work at the VNL, he served as the Head of the Fusion Energy Research Program at Lawrence Berkeley National Laboratory and worked at the Lawrence Livermore National Laboratory and Los Alamos National Laboratory. During the energy crisis of the 1970s, Dr. Bangerter's interest in energy issues grew. In 1976 he and David Judd served as chairmen of the first international "Summer Study of Heavy Ions for Inertial Fusion", a study that catalyzed interest in this new field. Dr. Bangerter has served on many advisory committees, most recently as Chair of the Program Advisory Committee for the Department of Energy's Virtual Laboratory for Technology for Fusion Energy Science. He also served as one of three chairmen of the national "2002 Fusion Summer Study" held at Snowmass, Colorado. Dr. Bangerter is a fellow of the American Physical Society and a recipient of the Distinguished Career Award given by Fusion Power Associates.

Riccardo Betti

Member

Riccardo Betti is Professor of Mechanical Engineering and Physics, and Assistant Director for Academic Affair at the Laboratory for Laser Energetics of the University of Rochester. He is also the Head of the Theory Department at the Princeton Plasma Physics Laboratory and the Director of the Fusion Science Center at the University of Rochester. Professor Betti received his Ph.D. in Nuclear Engineering from the Massachusetts Institute of Technology in 1992. He joined the University of Rochester as an Assistant Professor in 1991 and became full Professor in 2002. Professor Betti was elected a Fellow of the American Physical Society in 2001. His research is in the area of theoretical plasma physics with particular focus on the study of thermonuclear plasmas for applications in controlled thermonuclear fusion (magnetic and inertial). Professor Betti is currently Vice Chair of the DOE's Fusion-Energy-Science-Advisory-Committee (FESAC). He served as Chair of the NRC's Plasma Science Committee in 2007-2009. He also chaired the 2008-2009 FESAC panel on High Energy Density Physics and participated in several DOE panels and review committees on fusion sciences. In 2009, he received the Edward Teller medal from the American Nuclear Society and, in 2010, the Leadership award from the Board of Directors of Fusion Power Associates.

Jan Beyea

Member

Jan Beyea is the chief scientist of Consulting in the Public Interest where he consults on energy and environmental topics for numerous local, national, and international organizations, including the National Audobon Society and various university epidemiology research groups. He received a B.A. from Amherst College and a Ph.D. in physics from Columbia University. He has served as chief scientist and vice president of the National Audubon Society and has held positions at Holy Cross College, Columbia University, and Princeton University's Center for Energy and Environmental Studies. Dr. Beyea has been a member of numerous advisory committees and panels, including the NRC's Board on Energy and Environmental Systems, Energy Engineering Board, Committee on America's Energy Future, Committee on Alternative Energy R&D Strategies, and the Committee to Review DOE's Fine Particulates Research Plan. He currently is a member of the World Trade Center Health Registry Scientific Advisory Committee. He has also served on the Secretary of Energy Advisory Board's Task Force on Economic Modeling, been a member of the policy committee of the Recycling Advisory Council, and advised various Office of Technology Assessment. Dr. Beyea has expertise in energy modeling, energy technologies and associated environmental and health concerns, including pollutant exposure modeling, and he has written numerous articles on energy and the environment, including a recent policy forum in the journal, Science, on the subject of scientific research and the smart grid.

Robert L. Byer

Member

Robert Byer, NAS/NAE, is currently the director of Ginzton Laboratory at Stanford University. He received his Ph.D. in Applied Physics from Stanford University in 1969. Dr. Byer has made numerous contributions to laser science and technology including the demonstration of the first tunable visible parametric oscillator, the development of the Q-switched unstable resonator Nd: YAG laser, remote sensing using tunable infrared sources and precision spectroscopy using Coherent Anti Stokes Raman Scattering. His current research interests includes the development of nonlinear optical materials and laser diode pumped solid state laser sources for applications to gravitational wave detection and to laser particle acceleration. He was Chair of the Applied Physics Department from 1981 to 1984; Associate Dean of Humanities and Sciences from 1985 to 1987 and served as Vice Provost and Dean of Research at Stanford University from 1987 through 1992. He also served as Director of Hansen Experimental Physics Laboratory from 1997 through 2006. Professor Byer is a Fellow of the Optical Society of America, the Institute of Electrical and Electronics Engineers, the American Physical Society and the American Association for the Advancement of Science and the Laser Institute of America. In 1985 Professor Byer served as president of the IEEE Lasers and Electro-Optics Society. He was elected President of the Optical Society of America and served in 1994. He is a founding member of the California Council on Science and Technology and is serving as chair from 1995 - 1999. He has served on the Engineering Advisory Board of the National Science Foundation. Professor Byer has published more than 400 scientific papers and holds 40 patents in the fields of lasers and nonlinear optics. Professor Byer was elected to the National Academy of Engineering in 1987 and to the National Academy of Sciences in 2000.

Dr. Franklin Chang-Diaz

Member

Franklin Chang-Diaz is president and CEO of Ad Astra Rocket Company and an adjunct professor of Physics at Rice University and the University of Houston. He received a bachelor of science degree in mechanical engineering from the University of Connecticut in 1973 and a doctorate in applied plasma physics from the Massachusetts Institute of Technology in 1977. In 1973, he became heavily involved in the United States' controlled fusion program and doing intensive research in the design and operation of fusion reactors. Upon receibing his Ph.D., he joined the technical staff of the Charles Stark Draper Laboratory. His work at Draper was geared strongly toward the design and integration of control systems for fusion reactor concepts and experimental devices, in both inertial and magnetic confinement fusion. In 1979, he developed a novel concept to guide and target fuel pellets in an inertial fusion reactor chamber. Later on he was engaged in the design of a new concept in rocket propulsion based on magnetically confined high temperature plasmas. Selected by NASA in May 1980, Dr. Chang-Dìaz became an astronaut in August 1981. While undergoing astronaut training he was also involved in flight software checkout at the Shuttle Avionics Integration Laboratory, and participated in the early Space Station design studies. In late 1982, he was designated as support crew for the first Spacelab mission and, in November 1983, served as on orbit capsule communicator during that flight. From October 1984 to August 1985, he was leader of the astronaut support team at the Kennedy Space Center. His duties included astronaut support during the processing of the various vehicles and payloads, as well as flight crew support during the final phases of the launch countdown. He has logged over 1,800 hours of flight time, including 1,500 hours in jet aircraft. As a visiting scientist with the M.I.T. Plasma Fusion Center from October 1983 to December 1993, he led the plasma propulsion program there to develop this technology for future human missions to Mars. From December 1993 to July 2005 Dr. Chang-Dìaz served as Director of the Advanced Space Propulsion Laboratory at the Johnson Space Center where he continued his research on plasma rockets. A veteran of seven space flights, STS 61-C (1986), STS-34 (1989), STS-46 (1992), STS-60 (1994), STS-75 (1996), STS-91 (1998) and STS-111 (2002), he has logged over 1,601 hours in space, including 19 hours and 31 minutes in three spacewalks. Dr. Chang-Diaz served on the NRC's Plasma 2010 Decadal Survey. He has received numerous honors, including 7 NASA Space Flight Medals (1986, 1989, 1992, 1994, 1996, 1998); 2 NASA Distinguished Service Medals (1995, 1997), and 3 NASA Exceptional Service Medals (1988, 1990, 1993). In 1986, he received the Liberty Medal from President Ronald Reagan at the Statue of Liberty Centennial Celebration in New York City, and in 1987 the Medal of Excellence from the Congressional Hispanic Caucus.

Steven C. Cowley

Member

Steven C. Cowley is currently the CEO and director of the United Kingdom Atomic Energy Authority. He earned his Ph.D. from the Department of Astrophysical Sciences at Princeton University in 1985. He became Director at Culham in September 2008 and was appointed as Chief Executive Officer of the United Kingdom Atomic Energy Authority in November 2009. He received his BA from Oxford University and his PhD from Princeton University. Professor Cowley's post-doctoral work was at Culham and he returned to Princeton in 1987. He joined the faculty at the University of California Los Angeles in 1993, rising to the rank of Full Professor in 2000. From 2001 to 2003 he led the plasma physics group at Imperial College, London. He remains a part time professor at Imperial College. His research interests at Imperial include fusion theory; plasma and atomic theory associated with x-ray laser development; space and astrophysical plasmas; and multiphoton processes.

Dr. Cowley served in 1997 on the Fusion Energy Sciences Advisory Committee (FESAC) International Thermonuclear Experimental Reactor (ITER) physics review panel. He has served as a member of the organizing committee for the annual Sherwood Fusion Theory meeting and as chair of the NRC Plasma Science Committee (1999-2001). Dr. Cowley was also a member of the NRC Physics Survey Overview Committee, which produced the overview volume for the Physics in a New Era decadal physics survey and was a member of the NRC’s Burning Plasma Assessment Committee. Dr. Cowley is a fellow of the American Physical Society (APS) and the Institute of Physics (IOP), the recipient of a number of awards for excellence in teaching at UCLA, and the recipient of a number of fellowships, including the Harkness Fellowship and the Charlotte Elizabeth Proctor Fellowship. He has published over 100 papers and articles. Professor Cowley co-chaired the US National Academy's decadal assessment of, and outlook for, plasma science: Plasma Science: Advancing Knowledge in the National Interest (National Academy Press 2007). He is a Fellow of the American Physical Society and the Institute of Physics.

Richard L. Garwin

Member

Richard L. Garwin is an IBM Fellow Emeritus at the Thomas J. Watson Research Center in Yorktown Heights, New York. In addition, he is a consultant to the U.S. government on matters of military technology and arms control. His work for the government has included studies on antisubmarine warfare, new technologies in health care, sensor systems, military and civil aircraft, and satellite and strategic systems from the point of view of improving such systems as well as assessing existing capabilities. For example, he contributed to the first U.S. photographic reconnaissance satellite program, CORONA, that returned 3 million feet of film from almost 100 successful flights from 1960-1972. Dr. Garwin has made contributions in the design of nuclear weapons, in instruments and electronics for research in nuclear and low-temperature physics, in the establishment of the nonconservation of parity and the demonstration of some of its striking consequences, in computer elements and systems, including superconducting devices, in communication systems, in the behavior of solid helium, in the detection of gravitational radiation, and in military technology. He has provided Congressional testimony on matters involving national security, transportation, energy policy and technology. He is coauthor of many books, among them Nuclear Weapons and World Politics (1977), Nuclear Power Issues and Choices (1977), Energy: The Next Twenty Years (1979), Science Advice to the President (1980), Managing the Plutonium Surplus: Applications and Technical Options (1994), Feux Follets et Champignons Nucleaires (1997) (with Georges Charpak), and Megawatts and Megatons: A Turning Point in the Nuclear Age? (2001) (with Georges Charpak).

Dr. Garwin worked on the faculty of the University of Chicago before he joined IBM Corporation in 1952. Until June 1993, he was an IBM Fellow at the Thomas J. Watson Research Center; Adjunct Research Fellow in the Kennedy School of Government at Harvard University; and Adjunct Professor of Physics at Columbia University. He has been Director of the IBM Watson Laboratory, Director of Applied Research at the IBM Thomas J. Watson Research Center, and a member of the IBM Corporate Technical Committee. He has also been Professor of Public Policy in the Kennedy School of Government, Harvard University. From 1994 to 2004, he was the Philip D. Reed Senior Fellow for Science and Technology at the Council on Foreign Relations in New York. He was a member of the President's Science Advisory Committee 1962-65 and 1969-72, and of the Defense Science Board 1966-69. He is a Fellow of the American Physical Society, of the IEEE, and of the American Academy of Arts and Sciences; and a member of the National Academy of Sciences, the Institute of Medicine, the National Academy of Engineering, the Council on Foreign Relations, and the American Philosophical Society. In 2002, he was elected again to the Council of the National Academy of Sciences.

He received a B.S. in Physics from Case Institute of Technology, Cleveland, in 1947, and Ph.D. in Physics from the University of Chicago in 1949.

David Hammer

Member

David Hammer is the J. Carlton Ward Professor of Nuclear Energy Engineering and Professor of Electrical and Computer Engineering at Cornell University. He received his B.S. from Caltech in 1964 and his Ph.D. from Cornell in 1969. His research is in intense pulsed light ion beams, and intense ion beam interaction with gases and plasmas. He also researches HEDP using the dynamics of fine wires exploded by short high current pulses, as well as conducts plasma measurements by optical techniques using visible light and x-ray spectroscopy, laser-based diagnostic methods and advanced electro-optical instruments. He has been on the Cornell faculty since 1977. Dr. Hammer worked at the Naval Research Laboratory in 1969-1976, was a Visiting Associate Professor (part time) at the University of Maryland in 1973-1976, and was an Associate Professor at UCLA in 1977; in 1983 to 1984, 1991 and 2004 he was a Visiting Senior Fellow at Imperial College, London. He has been a consultant to several corporations and government laboratories. Dr. Hammer has authored or co-authored about 120 articles that have appeared in refereed journals and about 75 that have been published in conference proceedings. He holds a patent on the x-pinch x-ray source for application to lithography in microelectronics manufacturing, and another for using the X pinch for imaging biological specimens. Dr. Hammer is a Fellow of the American Physical Society (APS), of IEEE and of the AAAS. In 2004, he was the winner of the IEEE Plasma Science and Applications Committee Award. He served as the Chair-Elect of the Division of Plasma Physics (DPP) of the American Physical Society in 2003, and as the Chair of the division in 2004. Dr. Hammer was elected Division Councilor of the DPP in 2006 and is serving a 4-year term, ending in 2010, on the APS Council as a result. He is serving as a member of the APS Executive Board during 2009 and 2010. Dr. Hammer served on the NRC's High Energy Density Physics, Plasma2010, and QMU committees.

Joseph S. Hezir

Member

Joseph Hezir is the co-founder and managing partner of the EOP Group, Inc., a consulting firm that specializes in federal government regulatory strategy development and budget policy. He previously served 18 years in the White House Office of Management in positions of increasing responsibility, serving for 6 years as deputy associate director for energy and science. He has also served on a number of advisory bodies, including the National Aeronautics and Space Administration's Advisory Council and the Metropolitan Area Board of Directors for the Red Cross. He also was a member of the National Research Council's Burning Plasma Assessment Committee. He served on numerous NRC committees, including the Elementary Particle Physics survey, the Burning Plasma Assessment, the Committee on Cost of and Payment for Animal Research, and the Board on Physics and Astronomy.

Kathyrn McCarthy

Member

Kathryn McCarthy is director of Nuclear Science and Engineering at the Idaho National Engineering and Environmental Laboratory where she and her staff play a key role in conducting research and development in nuclear systems analysis and design, reactor and radiation physics, thermal fluids, nuclear fuels and materials, and fusion. She received her Master's and Ph.D. degrees in nuclear engineering from the University of California, Los Angeles, and her Bachelor's degree in nuclear engineering from the University of Arizona. She came to the INEEL Fusion Safety Program in 1991, focusing on examining the behavior of materials in the plasma-facing components of proposed fusion reactors. She also led a number of important experimental projects that have contributed to an understanding of the consequences of fusion reactor accidents. In 1994, McCarthy received the Fusion Power Associates Board of Directors' Excellence in Fusion Engineering Award for her “very important contributions to fusion safety engineering and in recognition of impressive leadership qualities.” In 1996, she received the International Thermonuclear Experimental Reactor Program Certificate of Merit for outstanding technical excellence and leadership in ITER Safety Research and Development. From 1998 to 2003, she served as the manager of the Nuclear Engineering Design and Research Department. McCarthy received the ANS Women's Achievement Award in 2000 for outstanding personal dedication and technical achievement for work she performed in the fields of nuclear science, nuclear engineering, research and education. In 2002, she was elected to the American Nuclear Society's board of directors. Last year she served as chair of the Idaho section of the ANS.

Lawrence T. Papay

Member

Larry Papay, NAE, is currently CEO and Principal of PQR, LLC, a management consulting firm specializing in managerial, financial, and technical strategies for a variety of clients in electric power and other energy areas. Dr. Papay received his B.S. in Physics from Fordham University in 1958, a M.S. in Nuclear Engineering from MIT in 1965, and his Sc.D. in Nuclear Engineering from MIT in 1969. Prior to PQR, he was Sector Vice President for the Integrated Solutions Sector at SAIC where he was responsible for business dealing with the integration of technology in the energy, environment and information areas for a variety of governmental and commercial clients worldwide. Prior to SAIC, Dr. Papay was the Senior Vice President and General Manager of Bechtel Technology & Consulting and was responsible for monitoring new technologies and developing new businesses, principally in the energy sector, employing those technologies including technological developments that impacted existing business lines as well as the engineering and construction business in general. Prior to Bechtel he was a Senior Vice President at Southern California Edison where he had a variety of responsibilities over his 21-year career including R&D, Engineering, Power Operations Transmission and Distribution, Power Generation, Nuclear Power, System Planning and General Administrative functions.

He is a nationally recognized authority in engineering, science and technology, a member of the National Academy of Engineering, and served on the NAE Council from 2004-2010. He also chairs the California Council for Science and Technology. He currently serves or has served on numerous special committees, panels, boards and task forces including the Department of Energy's Energy Research Advisory Board and the Laboratory Operations Board, the Department of Homeland Security's S&T Advisory Committee as well as the President's Council of Advisors on Science and Technology, National Science Foundation, National Research Council, American Nuclear Society, and Electric Power Research Institute. He is a registered Professional Engineer (Nuclear) in California.

Ken Schultz

Member

Kenneth Schultz retired from General Atomics (GA) in May 2011. Prior to his retirement he was the project manager of the Energy Multiplier Module (EM2) project in the Fission Division of the Energy and Electromagnetic Systems Group at General Atomics. Prior to joining GA in 1971, he worked on Boiling Water Reactor core design at General Electric Nuclear Energy Division. From 1971 to 1975, he was section leader in the High Temperature Gas Reactor Core Design Department, responsible for the reactor physics design and fuel cycle physics and economics analyses of the 2000 and 4000 MW(t) HTGR. From 1975-1990, he was Manager of GA's Fusion Technology Development Department, and the project manager for numerous fusion technology tasks, including the ARIES Tokamak Design Study, the DOE ICF Reactor Design Study, and the initial ITER First Wall/Divertor Design. He led a series of fusion-fission hybrid reactor studies in cooperation with LLNL and other DOE labs. From 1990 to 2001, he was the founding Director of GA's Inertial Fusion Technology Division, directing a staff of 50 on DOE's Inertial Confinement Fusion Target Fabrication Project, providing research, development, production, and characterization of ICF targets for the five ICF National Laboratories, and developing target-related technologies for inertial fusion energy. From 2000 to 2009, he served as Operations Director of the Energy Group, reporting to the Senior Vice President, with oversight responsibilities for the Fission, Inertial Fusion Technology and Photonics Divisions. During this time he provided project management support to the HELLADS laser development project for DARPA and had responsibility for developing GA's program to develop use of nuclear power to produce hydrogen. He has served on several fusion technical policy panels including the Environment Safety and Economics Committee and the Low Activation Materials Panel. From 2008 to 2010, he served on the DOE Hydrogen and Fuel Cell Technical Advisory Committee. He is a member of the American Nuclear Society and from 2000-2003 and 2009-2012 served on its Board of Directors. He is a prior chairman of the ANS/Fusion Energy Division and a leader in founding the ANS Nuclear Production of Hydrogen Working Group in 2005. He served on the board of directors of the National Hydrogen Association from 2003 to 2006 and 2009 until 2011. He is a Registered Professional Nuclear Engineer.

Andrew M. Sessler

Member

Andrew Sessler, NAS, is Director, Emeritus, and Distinguished Emeritus Scientist at E.O. Lawrence Berkeley National Laboratory. His current work focuses on accelerators and beams of particles and photons, and the design of modern accelerators (colliders) and synchrotron sources. Of particular interest to Dr. Sessler are the theoretical problems related to the manipulation of beams, such as beam-beam effects (in colliders), collective instabilities; novel acceleration techniques such as laser-plasma acceleration, wake-field accelerators, inverse free-electron accelerators; the international aspects of physics; and science education. He is a member of the National Academy of Sciences; cited for his contribution to the understanding of collective instabilities in high-current high energy accelerators are of fundamental importance to the design of modern accelerators. He has been on several NRC committees included membership on the Committee on High-Energy-Density Plasma Physics Assessment (2001-2003), the Committee on Fusion Science Assessment (1999-2001), and the Plasma Science Committee (2010-).

John Sheffield

Member

John Sheffield is currently a senior fellow at the University of Tennessee–Knoxville. He retired as Executive Director of Joint Institute for Energy and Environment and Director for Energy Technology Programs at the Oak Ridge National Laboratory in 2003. From 1958 to 1966, he worked for the United Kingdom Atomic Energy Authority (UKAEA) at Harwell and Culham Laboratories in England. He is a fellow of the American Physical Society and the American Nuclear Society. From 1966 to 1971, he was an assistant professor in the Physics Department of the University of Texas at Austin, teaching and doing research on oblique shockwaves in plasmas and diagnostics—including the scattering of radiation from plasmas. From 1971 to 1977, he worked on fusion energy research at the United Kingdom Atomic Energy Authority's (UKAEA) Culham Laboratory and the Joint European Torus experiment. From 1977 to 1994, he was in the Fusion Energy Division at ORNL, serving as Division and Program Director from 1988 to 1994. From 1987 to 2003, he was Executive Director of JIEE and Director for Energy Technology Programs at ORNL. He was a member of the Department of Energy's Fusion Energy Science Advisory Committee, serving as chair from 1996 to 2000. He has published widely in the areas of plasma physics, fusion energy science and technology, and issues of energy needs, production and use. His current research interests are in world population growth and future energy demand and resources, the role of energy efficient technologies, opportunities for fusion energy, the connection of energy use and the environment, the role of improved transportation systems in reducing air pollution in the Smokies region, and issues and opportunities for solutions in the farm animal manure area. Prior to being involved in the general energy and environmental research areas he conducted substantial and significant research in plasma physics and fusion energy science and technology. He earned his Ph.D. and M.Sc. from London University.

Thomas A. Tombrello, Jr.

Member

Thomas Tombrello is the William R. Kenan, Jr. Professor of Physics, the Chairman of the Division of Physics, Mathematics, and Astronomy, and the Technology Assessment Officer at the California Institute of Technology. His research interests and expertise in the applications of nuclear and ion beam physics to problems in materials science, geochemistry, and technology. Prior to his positions at Caltech, he taught at Yale University as an assistant professor of physics, and began his career as a research fellow at Rice University. He has received numerous awards and distinctions in his field; including, but not limited too, the Navas Prize, the Sigma Xi Award for Masters Thesis, and a doctorate of Philosophy honoris causa from Uppsala University. Dr. Tombrello studied Physics at Rice University where he earned his Ph.D. in 1961, his M.A. in 1960, and his B.A. in 1958.

Dennis G. Whyte

Member

Dennis Whyte is a professor of Nuclear Science and Engineering at the Massachusetts Institute of Technology. He received his Ph.D. in Applied Physics from the University du Quebec in 1992 while studying at Canada's national fusion research facility, the Tokamak de Varennes in Montreal. Dr. Whyte's primary research focus is on experimental solutions to the numerous problems caused by plasma-surface interactions (PSI) in magnetic confinement fusion power reactors. PSI science touches on nearly every aspect of plasma and material sciences, and the complex coupling between the two. Dr. Whyte is also interested in ion beam surface analysis. Prior to his position at MIT, he was an Assistant Professor in the Department of Engineering Physics at University of Wisconsin at Madison. He served on the NRC's Review of the U.S. Plan for Participation in ITER Committee.

Jonathan S. Wurtele

Member

Jonathan Wurtele is a professor at the University of California, Berkeley. Dr. Wurtele earned his B.A. in 1979 and his Ph.D. in 1985 from the University of California, Berkeley. His research interests are in advanced accelerator concepts, intense laser-plasma interaction and the basic equilibrium, stability, and radiation properties of intense charged particle beams. His research includes basic theory, simulation and the development of proof-of-principle experiments. After two years as a postdoc, he joined the MIT Physics Department as an Assistant Professor in 1987. In 1990 he was a foreign fellow at the Institute for Space and Astronautical Science in Japan. He returned to Berkeley in 1995. He has served on the NRC's Plasma Science Committee, HEDP Committee, and Fusion Science Assessment Committee.

Rosa Yang

Member

Rosa Yang is vice president, Innovation, at the Electric Power Research Institute (EPRI). She joined EPRI in 1987 as a Project Manager in the Light Water Reactor Fuel Program, focusing her research activities on fuel design, fuel failure investigation, corrosion, and the impact of plant operation on fuel performance. In 1998, Yang established EPRI's Fuel Reliability Program, with participants from more than 10 countries and 30 nuclear utilities. As Director of the Materials and Chemistry Department within EPRI's Nuclear Power Sector, Yang guided research activities designed to enhance scientific understanding of nuclear issues, and to improve the safe, reliable and economic operation of nuclear power reactors. With a multi-disciplined technical staff, she lead research activities in boiling water reactor and pressurized water reactor materials aging and degradation, water chemistry control, fuel performance and reliability, spent fuel storage, high and low-level waste disposal, and radiation control. Before joining EPRI, Yang worked for General Electric, where she developed the company's fuel design and licensing code. She also served as the technical lead for several internationally sponsored fuel testing programs. Yang is a frequent guest speaker and published author on nuclear fuel and materials technology issues. She has delivered featured presentations at numerous key industry events, including the International Light Water Reactor Fuel Performance Meeting, Annual American Nuclear Society Meeting, and Nuclear Regulatory Commission's Regulatory Information Conference. Dr. Yang holds a Bachelor of Science in nuclear engineering from the National Tsing Hua University in Taiwan, and a Master of Science and doctorate in nuclear engineering from the University of California at Berkeley.