

A Strategy to Optimize the U.S. Optical and Infrared System in the Era of the Large Synoptic Survey Telescope (LSST)

Committee

Debra M. Elmegreen

Chair

Debra Elmegreen is the Maria Mitchell Professor of Astronomy and department chair of the department of physics and astronomy at Vassar College in Poughkeepsie, New York. She received her Ph.D. in astronomy from Harvard University in 1979. Her research interests include structure, interactions, and star formation in galaxies in the local universe and at high redshift. She observes in optical, near-infrared, and radio wavelengths. Her research often involves undergraduates, through the Undergraduate Research Summer Institute and the Keck Northeast Astronomy Consortium. Elmegreen was on the 1998 NRC Panel for Postdoctoral Fellowships. She is a member of the American Astronomical Society (AAS) and has served on several AAS committees including the Astronomy Education Board (1999-2002) as council liaison, as AAS representative to USNC-IAU Board (1999-2002), and on the Warner and Pierce Prize Committee (2005-07, chair 2006-07). She served on the NSF's External Review Committee for the CTIO Small and Moderate Aperture Research Telescope System (SMARTS; 2003), on the NSF Program Review Panel for NOAO (2002-2004), and on the NSF's Waterman Prize Committee (2006-present). She has served on the Hubble Space Telescope (HST) Telescope Allocation Committee (1992, 1998, 2002) and the HST Space Telescope Users Committee (1998-2001, chair 2002-05). She has served on the Spitzer Space Telescope (SST) Telescope Allocation Committee (2004; IPAC ADP 1993), and the Postdoctoral fellowship committee (2006-2008, chair 2008). She has served on the National Optical Astronomy Observatory (NOAO) Systems Committee on Optical/Infrared Astronomy (2003-2004), and the NOAO Survey Telescope Allocation Committee (2008). She has served on the National Radio Astronomy Observatory (NRAO) Users Committee (1993-97), and the NRAO Telescope Allocation Committee (2002-04). She has also served on several scientific organizing committees (SOC) including the SOC, IAU Colloquium 157: Barred Galaxies, Alabama, 1995; the Working group, IAU XXV, Women in Astronomy, Sydney, 2003; the Program Committee, Conference on Women in Astronomy, Caltech 2003 SOC, Penetrating Bars through Masks of Cosmic Dust: The Hubble Tuning Fork strikes a New Note, South Africa, June 2004; the SOC, Spitzer Conference: The Evolving Interstellar Medium in the Milky Way and Nearby Galaxies, Pasadena, 2007; and the SOC, Galaxy Wars: Stellar Populations and Star Formation in Interacting Galaxies Conference, Tennessee, 2009. She was president of the American Astronomical Society from 2010-2012. She is on the Board of Directors of AURA. Dr. Elmegreen was a member of the NRC's Astronomy and Astrophysics Survey Committee (Astro2010). She has been vice-chair of the BPA since 2012. She was inducted as a Fellow of the American Association for the Advancement of Science in 2012.

Todd A. Boroson

Member

TODD BOROSON is the Maria Mitchell Professor of Astronomy and director of the Las Cumbres Global Telescope Network. Prior to his work at Las Cumbres, he had been director, deputy director, and an astronomer on staff at the National Optical Astronomy Observatory (NOAO). NOAO, primarily funded by the National Science Foundation, operates observatories at Kitt Peak and at Cerro Tololo Inter-American Observatory (CTIO). He has published numerous scientific papers on extragalactic astronomy, concentrating mostly on stellar populations and quasars, but also including instrumentation and data management for astronomy. He was the first U.S. Project Scientist for Gemini, NOAO deputy director, and, most recently, interim director of NOAO for almost two years, during which time he formulated NOAO's response to the NSF Division of Astronomical Sciences Senior Review. Dr. Boroson was a member of the Council of the American Astronomical Society, the NRC Committee on Astronomy and Astrophysics (CAA) and of the previous (McKee/Taylor) Astronomy and Astrophysics Survey committee, including the role of vice-chair of the panel on Optical and IR Astronomy from the ground. Following the recommendations from that survey, he led the design and implementation of a number of programs aimed at developing a community-wide perspective of ground-based O/IR facilities as a system, including the Telescope System Instrumentation Program (TSIP), Renewing Small Telescopes for Astronomical Research (ReSTAR), and Access to Large Telescopes for Astronomical Instruction and Research (ALTAIR). More recently he served on the Astro2010 Program Prioritization Panel on Optical and Infrared Astronomy from the Ground.

Debra Fischer

Member

DEBRA FISCHER is a professor in astronomy at Yale University. She previously served as an assistant professor at the University of California, Berkeley, in the Department of Physics and Astronomy. Her research is centered on the detection and characterization of planets orbiting other stars. Dr. Fischer has been a principal investigator (PI) on several projects, including the Lick Planetary Search program, the CTIO planet search in Chile, and Doppler analysis software. She is the PI for CHIRON, a high-resolution spectrometer to look for rocky planets around Alpha Centauri A and B stars, which is centered at CTIO. Dr. Fischer discovered the first known multiple planet system while at San Francisco State University. She led an international consortium to carry out a search for planets around metal-rich stars, which found 50 such stars. Dr. Fischer has also modeled spectra of stars on planet search programs at several observatories, demonstrating a strong correlation between the chemical composition of stars and the presence of gas giant planets. She is currently on the NASA Management Operations Working Group and the NSF Portfolios Review Committee. Dr. Fischer received her B.S. from the University of Iowa, her M.S. in physics from San Francisco State University, and her Ph.D. in astrophysics from the University of California, Santa Cruz. She is a member of the Committee on Astronomy and Astrophysics and served on the NSF Portfolio Review Committee.

Joshua A. Frieman

Member

JOSHUA A. FRIEMAN is a scientist with the Theoretical Astrophysics Group at the Fermi National Accelerator Laboratory (Fermilab), where he previously served as head. He is a professor of astronomy and astrophysics at the University of Chicago, where he is also a member of the Kavli Institute for Cosmological Physics. In addition, he is currently the committee chair of the Adler Planetarium. He is a fellow of APS and the AAAS and is a trustee of the Aspen Center for Physics. Dr. Frieman served on the executive committee of the APS division of astrophysics. Dr. Frieman's research centers on theoretical and observational cosmology, including studies of the nature of dark energy, the very early universe, gravitational lensing, the large-scale structure of the universe, and supernovae as cosmological distance indicators. He is the author of more than 200 publications, has led the SDSS Supernova Survey, and served as chair of the SDSS Collaboration Council. He is a founder of the Dark Energy Survey and serves as co-chair of its Science Committee. He earned a B.Sc. degree from Stanford University and a Ph.D. in physics from the University of Chicago. Dr. Frieman recently served on the NRC's Committee on the Assessment of a Plan for U.S. Participation in Euclid. He was also a member of the Astro2010 Decadal Survey Committee and its Panel on Particle, Nuclear, and Gravitational-Wave Astrophysics. He currently serves on the Committee on Astronomy and Astrophysics.

Lynne Hillenbrand

Member

LYNNE HILLENBRAND is a professor of astronomy and executive officer for astronomy at the California Institute of Technology (Caltech). Her research interests are in star formation, young stars and stellar clusters, accretion and debris disks, planet formation, and extrasolar planets. Dr. Hillenbrand's research deals with observational and data analysis experience covering wavelengths from x ray to millimeter, although focusing mostly on optical/near-infrared science. She has served over the past decade on the U.S. National Committee for the International Astronomical Union and is currently vice chair of that committee through 2013. In addition, she is serving on the Las Cumbres Observatory Science Advisory Board and NASA's Cosmic Origins Program Assessment Group. Other service to the astronomy and astrophysics community includes membership on the Astronomical Society of the Pacific board of directors, the Association of Universities for Research in Astronomy board of directors, the National Optical Astronomy Observatory's ALTAIR (Access to Large Telescopes for Astronomical Instruction and Research) committee, NSF's Astronomy and Astrophysics Advisory Committee's Exo-Planet Task Force Subcommittee, the first NSF "Senior Review" of Facilities, the NASA Origins Sub-Committee of the Office of Space Science FACA structure, as well as numerous science steering or advisory committees for various observatories and facilities. Dr. Hillenbrand received her Ph.D. in astronomy from the University of Massachusetts. She was a member of the NRC's Astro2010 Decadal Survey Committee and served on the subsequent Panel on Implementing Recommendations from New Worlds, New Horizons Decadal Survey. She was also a member of the Panel on Ultraviolet, Optical, and Infrared Astronomy from Space of the 2001 astronomy and astrophysics decadal survey, and serves on the Committee on Astronomy and Astrophysics.

Buell T. Jannuzi

Member

BUELL T. JANNUZI is Head of the Department of Astronomy and Director of the Steward Observatory at the University of Arizona. The University of Arizona's Department of Astronomy and its affiliated Steward Observatory are world-leading centers for astrophysical research. Previously, Jannuzi served as Director of Kitt Peak National Observatory and Associate Director of the National Optical Astronomy Observatory (2005-2010) during his 17-year tenure (1995-2012) as member of the scientific staff of the NOAO. He earned degrees at Harvard College and the University of Arizona (Ph.D. in Astronomy), followed by five years as a member of the Institute for Advanced Study (IAS) in Princeton, New Jersey. Jannuzi was recognized in 1993 as a future leader in the field with one of NASA's prestigious Hubble Fellowships. His main scientific interests include the formation and evolution of individual, group, and large-scale structures of galaxies and the determination of the physical processes that produce quasars and other active galactic nuclei. Jannuzi has been heavily involved with many major surveys of the universe, including one of the original three "Key Projects" for the Hubble Space Telescope, the Quasar Absorption Line Survey, and was co-Principal Investigator for an ambitious survey of galaxy evolution, the NOAO Deep Wide-Field Survey. Jannuzi served on the Board of Directors or Science Advisory Committee of numerous major ground-based and space observatories (including Gemini Observatory, Spitzer Space Telescope, Fermi Space Telescope, Large Binocular Telescope, Large Synoptic Survey Telescope, and the Giant Magellan Telescope), and was President of the Board of Directors of the International Dark Sky Association.

Robert P. Kirshner

Member

ROBERT P. KIRSHNER (NAS) is the Clowes Professor of Science at the Harvard-Smithsonian Center for Astrophysics. He is a world leader in the study of supernovae and their application to astronomy and cosmology. His work on Supernova 1972E, explorations of large-scale structure, studies of Supernova 1987A in the Large Magellanic Cloud, and new methods for measuring extragalactic distances have all been fundamental contributions to astrophysics. He is an observational astronomer who uses supernova explosions to measure the size and motion of the universe. This work contributed to the discovery of cosmic acceleration that led to the Nobel Prize in Physics in 2011 for two of his graduate students. He has also been engaged in efforts to measure the distribution of galaxies in three dimensions through large redshift surveys. Dr. Kirshner is a member of the National Academy of Sciences, and he has served as president of the AAS. He is a member of the U.S. National Committee for the International Astronomical Union, the Proceedings of the National Academy of Sciences editorial board, the Expert Content Group for the Exhibition on Wonders of Science—Subcommittee of the Marian E. Koshland Science Museum Advisory Committee, the Communications Advisory Committee, the Panel on Cooperation with the USSR in High Energy Astrophysics, the Organizing Committee for the First Annual Symposium of Frontiers of Science, the Committee on Space Astronomy and Astrophysics, and the Task Group on the Scope of the Space Telescope Science Institute. He received his Ph.D. in Astronomy from Caltech. He was the vice chair of the NRC's Astro2010 Panel on Stars and Stellar Evolution and a member of the Astro2010 Panel on Optical and Infrared Astronomy from the Ground. He serves on the Committee on Astronomy and Astrophysics.

Lori M. Lubin

Member

LORI M. LUBIN is a professor in the Department of Physics at the University of California, Davis (UCD). She served as Vice Chair of Administration and Undergraduate Affairs in the Department of Physics from 2006-2011. Prior to UCD, she was an associate research scientist in the Department of Physics and Astronomy at the Johns Hopkins University and an assistant astronomer at the Space Telescope Science Institute. Dr. Lubin has spent the past 20 years studying galaxy groups, clusters, and superclusters at redshifts of $z > 0.5$. Her research focuses on a comprehensive, multi-wavelength (radio to X-ray) approach to understanding galaxy evolution and cluster formation through detailed photometric and spectroscopic observations. Dr. Lubin has been awarded over 100 nights of observing time at the premier ground-based optical, infrared, and radio observatories, included Keck, Gemini, Subaru, KPNO, CFHT, Palomar, Las Campanas, UKIRT, and the VLA. In addition, she has had many successful observing programs with HST, Chandra, XMM, and Spitzer. She served as a panel chair of the NASA Keck and HST Telescope Allocation Committees, as well as the chair of the Space Telescope Users Committee. She has also served on peer review panels for ALMA, Chandra, NASA, NSF, VLA, and Spitzer. She is currently a member of the UC Observatories Advisory Committee and the TMT Science Advisory Committee. She was the recipient of the prestigious Carnegie and Hubble Fellowships. Dr. Lubin earned her Ph.D. in Astrophysical Sciences from Princeton University.

Robert Lupton

Member

ROBERT H. LUPTON is a Senior Research Astronomer at Princeton University, and the Algorithms Lead for the Large Survey Synoptic Telescope (LSST). At Princeton Dr. Lupton was the principle author of the photometric pipeline for the Sloan Digital Sky Survey (SDSS), and is leading the data analysis for the HyperSuprimeCam project on Subaru in addition to his work on the LSST. His research interests are in astronomical algorithms, statistical descriptions of data, and large software systems. Dr. Lupton was awarded the Muhlbach prize of the ASP in 2005. He earned his Ph.D. in astronomy from Princeton University. Dr. Lupton was a member of the JDEM science definition team.

Paul L. Schechter

Member

PAUL L. SCHECHTER (NAS) is the William A. M. Burden Professor of Astrophysics at the Massachusetts Institute of Technology (MIT). Dr. Schechter's research interests are galaxies, clusters of galaxies, the distribution of dark matter, and adaptive optics. He is also familiar with observational techniques such as microlensing and gravitation lensing. Prior to joining the faculty at MIT, Dr. Schechter held postdoctoral positions at the Institute for Advanced Study and the University of Arizona, a faculty position at Harvard, and staff positions at Kitt Peak National Observatory and the Carnegie Observatories. He has carried out optical observations of the mirages produced by extragalactic gravitational potentials using the Hubble Space Telescope and ground-based telescopes. He also helped develop the adaptive optics system for the Carnegie Institute of Washington's Magellan Telescopes. Dr. Schechter received his B.S. in physics and mathematics from Cornell University and his Ph.D. in physics from the California Institute of Technology. He was a member of the Astro2010 Panel on Electromagnetic Observations from Space, is currently a member of the Board on Physics and Astronomy, and also serves as co-chair of the Committee on Astronomy and Astrophysics.

Paul A. Vanden Bout

Member

PAUL A. VANDEN BOUT is a Senior Scientist at the National Radio Astronomy Observatory (NRAO). He received his Ph.D. in Astronomy from University of California, Berkeley in 1966. He was a professor at University of Texas at Austin and Astronomy Department Chair from 1978-1982. He was Director of NRAO from 1985 to 2001. As NRAO Director, Dr. Vanden Bout oversaw the construction of the Very Long Baseline Array, ten remotely controlled radio telescopes that work together as the world's largest, full-time astronomical instrument; and the Robert C. Byrd Green Bank Telescope, the world's largest fully steerable radio telescope. Dr. Vanden Bout also played an instrumental role in forging the international partnership for the Atacama Large Millimeter Array, an array of 12-meter millimeter-wave antennas to be constructed in northern Chile. He is a Fellow of the American Physical Society and the American Association for the Advancement of Science, a member of the American Astronomical Society and the International Astronomical Union (Commission 34 on Interstellar Matter and Commission 40 on Radio Astronomy). He served on the Astro2010 Survey Committee and was a member and chair of the Committee on Radio Frequencies. He served on the Time Allocation Committee for NASA-funded time on the Keck Observatory telescope from 2010-2013 and on the Astronomy and Astrophysics Advisory Committee from 2010-2013.

J. C. Wheeler

Member

J. CRAIG WHEELER is the Samuel T. and Fern Yanagisawa Regents Professor of Astronomy at the University of Texas, Austin, where he was chair of the department. He was a research fellow at Caltech working in Nobel Laureate Willy Fowler's group. Dr. Wheeler was an assistant professor of astronomy at Harvard University. He specializes in the astrophysics of violent events—supernovae, neutron stars, black holes, gamma-ray bursts—and the relation of these events to astrobiology. He was elected to the Academy of Distinguished Teachers at the University of Texas and won a state-wide Regent's Teaching Award. He served as president of the American Astronomical Society (AAS). He has been a fellow of the American Physical Society (APS) and was awarded the Hyer Award for Best Dissertation Supervisor of the Texas Section of the APS. Dr. Wheeler has published nearly 300 papers in refereed journals and many conference proceedings and has edited books on supernovae and accretion disks. He has also written a popular astronomy book, *Cosmic Catastrophes: Supernovae, Gamma-Ray Bursts and Adventures in Hyperspace*. He received his Ph.D. in physics from the University of Colorado. Dr. Wheeler has served on numerous NRC committees, including the Space Studies Board, the Committee on the Astrophysical Context of Life, the Committee on the Scientific Context for Space Exploration, and the Committee on an Assessment of Balance in NASA's Science Programs, among others. He serves on the Committee on Astronomy and Astrophysics, and served on the Astro2010 Infrastructure Working Group on Facilities, Funding, and Programs.