# Andrew Marienhoff Sessler FREE

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boson—the so-called God particle. Thus was conceived the Large Hadron Collider at CERN with its avowed goal of detecting the elusive boson. Success was announced at CERN on 4 July 2012, an event to which Gerry and I traveled together. (His comparison of the festive atmosphere there to a football game was widely quoted.) Meanwhile, the increasing awareness of work done in 1964 on SBS theory had led the American Physical Society to award the 2010 J. J. Sakurai Prize for Theoretical Particle Physics to Gerry and the five other authors of the three relevant SBS papers. (That sixfold citation remains a record for the society's awards.) In the many speaking invitations that Gerry later received, he frequently recalled a conversation he had had with Werner Heisenberg in 1965. In that exchange Gerry was told in no uncertain terms that SBS theories could not possibly succeed.

After leaving Imperial College London in 1965, Gerry briefly served as a research associate at the University of Rochester, where he and I continued our SBS collaboration. Then in 1967 he went to Brown, where he was the Chancellor's Professor of Physics. He continued to be a highly innovative and productive researcher and was an early advocate and user of computers in particle-physics applications. There again he showed his willingness to depart from the orthodoxy of the times, which was long resistant to the introduction of computer technology into theoretical particle physics. He cast a long shadow on the computer systems at Los Alamos National Laboratory, where he spent many years as a consultant and staff member, and at Brown. To the end he continued his collaborations, including with his son, Zachary, who was inspired by his father's groundbreaking work to pursue the study of particle physics.

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# Andrew Marienhoff Sessler

Andrew Marienhoff Sessler, visionary former director of Lawrence Berkeley National Laboratory (LBNL), one of the most influential accelerator physicists in the field, and a human-rights activist, died on 17 April 2014 from cancer.

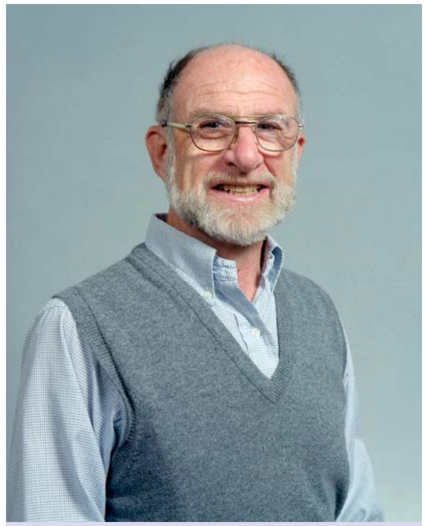
Born on 11 December 1928, Andy grew up in New York City. He was one of the first Westinghouse Science Talent Search finalists, for which he visited the White House as a high school senior in 1945. He enrolled at Harvard University just as World War II ended. He received a BA in mathematics, then went to Columbia University and earned a PhD in physics in 1953 under Henry Foley. After an NSF postdoc—in the first group ever awarded—at Cornell University with Hans Bethe and a stint on the faculty at the Ohio State University in 1954–59, Andy joined the Lawrence Radiation Laboratory—as LBNL was then called—in 1959; he spent the remainder of his career there.

Andy left his mark in several areas of physics, including nuclear structure theory, elementary-particle physics, and many-body problems. His 1960 paper with Victor Emery is generally acknowledged, along with a paper from a competing group led by Philip Anderson, as the first to predict the superfluid transition of helium-3.

His interest in accelerator physics began in the summer of 1955 when Andy was invited by Donald Kerst to join the Midwestern Universities Research Association study group. MURA researchers were working to host a multi-GeV proton accelerator project in the Midwest based on a novel accelerator scheme called the fixed-field alternating gradient. Although the project did not materialize, their R&D achievements profoundly transformed accelerator design from an intuitive art to a rigorous scientific discipline centered around beam physics.

In collaboration with Keith Symon, another MURA member, Andy studied the RF acceleration process and, for the first time in accelerator research, employed the full power of Hamiltonian dynamics and computer simulation, using the most powerful computer at that time, ILLIAC. They discovered a method to produce intense circulating beams by "stacking," repeatedly collecting the injected beam into a phase-space "bucket" and raising its energy. But if the intensity gets too high, beams in general become unstable, rendering them useless. In collaboration with several colleagues, Andy showed that high intensities can still be maintained by carefully controlling the beam environment. Those discoveries made high-luminosity proton colliders feasible; the most famous implementation, the Large Hadron Collider, recently discovered the Higgs particle.

After being at LBNL for several years, Andy became interested in the impact of science and technology on society. He helped usher in a new era of research on energy efficiency and sustainable energy technology and was instrumental in building the research agendas in those areas for the Atomic Energy Commission (AEC) and later the Department of Energy.



LAWRENCE BERKELEY NATIONAL LABORATORY

**Andrew Marienhoff Sessler**

In 1973 Andy was selected as LBNL's third director. His first act was to establish the energy and environment division, with Jack Hollander as director, and the two men started more than 50 research projects in the first year. The division initiated many major research programs in such fields as air-pollution chemistry and physics, solar energy technology, energy economics and policy, and internationally prominent energy efficiency technology under the guidance of Arthur Rosenfeld. Andy supported the development of the nation's largest geothermal research program, which led to the lab's establishing one of the nation's leading Earth-sciences research divisions.

Stepping down from his post as LBNL director in 1980, Andy returned to his first love—research. He began work in earnest on a new area of accelerator physics: the generation of coherent electromagnetic waves through the free-electron laser (FEL) interaction.

Together with Donald Prosnitz, Andy proposed in 1981 a high-gain FEL amplifier for high-power millimeter-wave generation. The group Andy assembled to perform and analyze the successful 1986 millimeter FEL experiment also explored FELs at x-ray wavelengths. The researchers found that the x-ray beam being amplified in a high-gain FEL does not diffract but stays close to the electron beam. That "optical guiding" phenomena presaged the success of x-ray FELs more than two decades later.

Andy noted that the high-power millimeter wave from an FEL can be used for high-gradient acceleration that could reduce the size, and hence the cost, of a multi-TeV electron linear collider. Thus he proposed in 1982 the concept of a two-beam accelerator in which a high-current, low-energy accelerator runs parallel to and supplies millimeter power to a low-current, high-energy accelerator. The scheme is still very much alive as the Compact Linear Collider project at CERN.

At the American Physical Society (APS), Andy helped expand the organization's focus to encompass many issues related to "physics and society," including national funding, science education, and arms control. With a life-long interest in promoting human rights, Andy was instrumental in initiating the APS Committee on International Freedom of Scientists and raising funds to endow the APS Andrei Sakharov Prize. He and Moishe Pripstein cofounded Scientists for Sakharov, Orlov, and Sharansky; the group's protests along with those of other groups led to the release of the three Soviet dissidents.

In 1998 Andy served as president of APS. He received many honors, including the AEC's Ernest Orlando Lawrence Award in 1970, APS's Dwight Nicholson Medal in 1994, and the Enrico Fermi Award from the US Department of Energy in 2014.

An avid outdoorsman, Andy enjoyed physical activities—swimming, rowing, skiing, bike riding—especially when shared with family and friends. Even later in life, when maintaining his bodily balance took extra effort, he kept up his lunchtime jogging routine and shared jokes and some good physics with the entourage around him. He was a mentor to many younger colleagues and to many his own age who learned more from him than a lot of them realized at the time. Andy ever kept the physics community at the center of his life and work.

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