

Matthew Linzee Sands

Matthew Linzee Sands, known for his work as an accelerator physicist, administrator, and author, died peacefully at his home in Santa Cruz, California, on 13 September 2014.

Born on 20 October 1919 in Oxford, Massachusetts, Sands was the first in his family to attend college. He graduated with a BS degree in physics and mathematics from Clark College in Worcester, Massachusetts, in 1940, and then went to graduate school at Rice University in Houston, Texas. After leaving Rice with an MS degree in physics in 1941, he got swept into World War II R&D and began work at the Naval Ordnance Laboratory in Washington, DC.

In 1943 Sands moved to the newly established Los Alamos laboratory, where the atomic bomb was being developed. There he became a member of the electronics group that designed and built many of the circuits and instruments needed for the work of all the lab's other groups. With his colleague William Elmore, he wrote *Electronics: Experimental Techniques* (McGraw-Hill, 1949), which became the recipe bible for advanced circuits. He was also a founder of the Federation of Atomic Scientists, which lobbied hard to limit the spread of nuclear weapons.

After the war ended in 1945, Sands went to MIT for his PhD; he worked on cosmic-ray physics with Bruno Rossi, whom he had come to know at Los Alamos. He completed his degree in 1948 and continued his research with Rossi, but he was called on by the head of MIT's Laboratory for Nuclear Science to solve a crucial problem: Its 300-MeV synchrotron had been completed but did not work, a considerable embarrassment. It is not clear what the problem was, but in less than a year Sands solved it and had the accelerator running. He turned an expensive lump of iron into a working research facility.

In 1950 Sands moved to Caltech, where work was about to start on what eventually became its 1.5-GeV synchrotron. Sands, Robert Walker, and Alvin Tollestrup oversaw the construction and eventually the operation of the facility. The project was successfully completed on schedule and on budget.

During his tenure at Caltech, Sands spent time in Italy at the Frascati National Laboratory, where he and post-doc Claudio Pellegrini made important contributions to understanding strong-

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focusing circular accelerators and storage rings.

Although Caltech scientists were content with their synchrotron, Sands had been thinking of much larger proton accelerators; I think he eventually became bored with Caltech. So in 1963, when Wolfgang Panofsky, the founding director of SLAC, was looking for a deputy director, he had an easy time recruiting Sands, whose experience with projects large and small made him an attractive candidate and an effective deputy. That was the same year I joined the SLAC faculty to lead the colliding-beam effort.

My interactions with Sands were important to me and to the lab. Although Stanford University experts knew all about linear accelerators, Sands and I were the only ones who had experience with circular machines.

It was natural that Sands and I came together at SLAC for a more technical collaboration than might have been expected between a young faculty person and the deputy director of a new and large lab. Besides being a technical sounding board, Sands was instrumental in the successful six-year struggle to get the funding that made the SPEAR electron-positron colliding-beam facility possible.

With Richard Feynman and Robert Leighton, Sands coauthored *The Feynman Lectures on Physics*, which came out in 1964. Leighton and Sands turned two years of lectures by Feynman into a three-volume textbook covering his introductory undergraduate physics courses at Caltech. Feynman had tried to produce a better unified undergraduate curriculum, but he came to believe

that he had made it too advanced for undergraduates. However, it has been an important book for more advanced students and faculty. In his article "Capturing the wisdom of Feynman" (PHYSICS TODAY, April 2005, page 49), Sands reminisced about how working on the book helped him realize his dream of introducing modern physics to undergraduates.

In 1969 the new University of California campus at Santa Cruz was building up, and Sands was offered the position of professor and vice chancellor for science. The opportunity to help guide the development of the science program at a new university was irresistible. Sands served as vice chancellor until fall 1972, when he returned to full-time teaching and focused on the undergraduate physics curriculum. He retired from the university in 1985.

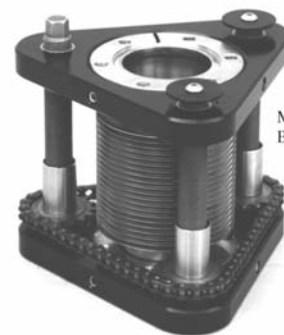
Matt Sands was a talented physicist with broad interests. He had an attractive personality, and I always found him to be a pleasure to talk to. More details of his career can be found in an oral history interview by the American Institute of Physics (<http://www.aip.org/history/ohilist/5052.html>).

Burton Richter

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