

IN MEMORIAM

STEVEN WEINBERG

Steven Weinberg, a visionary and audacious light who forever changed our understanding of the universe, died on 23 July 2021 in Austin, Texas. He was born in New York City on 3 May 1933 and received his Bachelor of Arts from Cornell University in 1954. At Princeton University, under Sam Treiman, he earned his PhD in nuclear physics in 1957.

Steve's remarkable 1967 paper "A Model of Leptons" unified electromagnetism and the weak nuclear interaction into one framework, his electroweak theory. In three pages, he used gauge theory to predict W and Z bosons as mediators of the weak interaction, their masses, the existence of neutral currents, and a "Higgs" boson—all subsequently confirmed by experiment. For that work, Steve was awarded the 1979 Nobel Prize in Physics, shared with Abdus Salam and Sheldon Glashow. Electroweak theory is the cornerstone of today's standard model, which unifies all the forces of nature save gravity. It is the work of many minds and Steve's consistent leadership.

His many other seminal contributions include, most notably, effective field theory, arguably one of his most important contributions to theoretical physics. It is a calculable low-energy approximation of the underlying fundamental theory. In a 2009 review article, Steve argued that the standard model is the leading term in an effective field theory. He proposed axions as a solution to a puzzling observation about the electromagnetic properties of neutrons.

The need for verification in experiment was central to Steve's thinking. He came to believe that further progress in particle physics required a national commitment. In 1987 and again in 1993, Steve Weinberg testified before Congress, stressing the need for the proposed Superconducting Super Collider, but Congress opted to fund the International Space Station.

His interest in cosmology led Steve to write his popular 1977 book *The First Three Minutes: A Modern View of the Origin of the Universe*. He inspired physicists and astronomers to work together to explain why the universe is the way it is. The state of the field is well described in his *Cosmology* (2008). One of his many contributions to cosmology was an explanation of why there is so little anti-matter in the universe based on concepts that are well motivated from particle physics. His audacious anthropic “explanation” of the smallness of the cosmological constant has greatly intrigued and influenced theoretical physicists.

For his monumental contributions to physics, Steve received many awards and honors, including the National Medal of Science in 1991. In presenting the Benjamin Franklin Medal to him in 2004, the American Philosophical Society said that Steve was “considered by many to be the preeminent theoretical physicist alive” at the time.

Steve’s academic career took him from Columbia University to the University of California, Berkeley. When Louise, his wife, was admitted to Harvard Law School in 1966, Steve received temporary appointments at MIT and Harvard, where in 1973 he became the Higgins Professor of Physics. The family moved to Palo Alto for a year in 1976 after Louise accepted a visiting offer from Stanford Law School, and Steve became a Visiting Professor in the university’s physics department. In 1980 Louise accepted a professorship at The University of Texas at Austin School of Law. Two years later Steve sought an appointment at Texas, where he founded The UT Theory Group and held the Josey Regental Chair in Science.

One thing that always impressed us about Steve was how hard he worked. It is well worth one’s effort to work through some of his complex calculations. He had a tremendous sense of the important challenges in theoretical physics that he could solve. He would not leave any stone unturned until he had a full grasp of the physics problem he was working on.

Steve’s practice was to write a book based on his notes for each of his classes. The results included his definitive three-volume set, *The Quantum Theory of Fields* (1995–2000), and his most recent book, *Foundations of Modern Physics* (2021). Steve’s other popular books include *Dreams of a Final Theory* (1992) and *To Explain the World: The Discovery of Modern Science* (2015). A frequent contributor to the *New York Review of Books*, he never shied away from expressing his views on religion and society. Steve was an engaging speaker, well-versed in history and literature, a true Renaissance man. He also had a sense of humor that captivated audiences.

Steve cared deeply about students, as several of his former students could attest and wrote in online tributes to him (see “Steven Weinberg (1933–2021),” *Physics Today* online, 3 August 2021). He was also fully devoted to his family, his wife Louise, daughter Elizabeth, and his granddaughter Gabrielle.

Steven Weinberg is gone, a reality that is hard to accept. He will be remembered as one of the greatest physicists of all time.



Jay C. Hartzell, President
The University of Texas at Austin



Charlotte Canning, Secretary
The General Faculty

This memorial resolution was prepared by a special committee consisting of Professors Mark G. Raizen (chair), and Willy Fischler.