Bulletin of the AAS • Vol. 53, Issue 2

Edward Chupp (1927–2017)

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Published on: Nov 03, 2021

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**Edward Chupp died on Tuesday
February 21, 2017 at the age of 89.**

Dr. Chupp was a staff scientist at the University of California Radiation Laboratory at Livermore, now Lawrence Livermore National Lab, from 1954 until 1959. He was later chief of the geophysics division at Boeing Aerospace from 1959 to 1962 and a professor at the University of New Hampshire from 1962 until his retirement in 2007. He also held several guest positions at research institutions in Australia, China, and at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany.

Courtesy of Physics Today.

Edward Lowell Chupp was born in Lincoln, Nebraska on 14 May 1927. As a child he developed a fascination with electronics and radio and was determined to become an engineer. After graduating from high school, he enlisted in the Navy in June 1945 and served on the USS Cowpens in the Pacific as an electrician and fireman until the end of the war. Discharged in San Francisco, he enrolled in 1946 at the University of California, Berkeley, where his brother Warren was studying physics and assisting Ernest Lawrence in the development of high-energy particle accelerators for nuclear physics research. At Warren's urging, Edward switched from engineering to physics, receiving his BS degree in 1950. That year he met, and shortly thereafter married, Mary Miklos, with whom he formed a partnership at every level from family to science.

In 1954 Chupp received a PhD in physics from Berkeley, where he worked on detecting cosmic radiation from space. As part of his research, he deployed a neutron monitor at Makapu'u Point in Hawaii. After receiving the PhD, Chupp moved to Livermore, where he was a member of the team that used the 3 MeV A-48 accelerator to measure the interaction of high-energy protons with heavy elements and to perform precision measurements of nuclear energy levels. With Jesse DuMond, who moved from Livermore to Caltech, Chupp used bent crystals for precision measurements of gamma rays produced in proton-proton collisions and, most importantly, when neutrons and

protons combine to make deuterium. He moved to Boeing as the space race with the USSR was heating up, leading a team that evaluated the exposure of astronauts to radiation from solar flares.

With expertise in cosmic-ray detection techniques and solar physics, Chupp moved to the University of New Hampshire and established the prominent Solar Physics Group focused on detecting cosmic gamma rays, the signature of nuclear reactions. Earth's atmosphere strongly absorbs gamma rays and other cosmic particles, protecting life on the ground from harmful radiation. To measure the gamma rays, instruments were lifted to the upper atmosphere on scientific balloons and then by satellites.

Chupp was Principal Investigator of the Gamma Ray Monitor (GRM) on the Orbiting Solar Observatory (OSO) 7, in orbit from 1971 to 1974. The discoveries of the GRM included gamma rays from neutrons produced in nuclear reactions in solar flares and gamma rays from the annihilation of antimatter particles—specifically, positrons or antielectrons. The field of gamma-ray astronomy, based on many of Chupp's pioneering contributions, blossomed into a new window into the cosmos as summarized in Chupp's 1976 book [*Gamma-ray astronomy: Nuclear transition region* \[1\]](#).

Arguably, Chupp's most lasting contributions arose from his role as principal investigator of the Gamma-Ray Spectrometer (GRS) on the Solar Maximum Mission, which orbited Earth from 1980 to 1989. The GRS recorded spectra from a multitude of solar flares, demonstrating the ubiquity of energetic particles produced in solar activity. The GRS database was vastly greater than that of the GRM, with many of the findings even contradicting the conventional wisdom established with OSO-7. The rich nature of the solar-flare spectrum, the common features of impulsive emission, and the acceleration of particles to high energies long after the conventional flare subsided were a few of the key findings stemming from the GRS. Chupp authored his last paper in 2009 on the phenomenon of these very high energy events, capping a 36-year publication record in high-energy solar physics. The GRS was also used to register emissions from supernova 1987A and numerous cosmic gamma-ray bursts, whose origin was not made clear for another 10 years.

For many years, Chupp led other gamma-ray experiments that operated from high-altitude balloon platforms and was the first to fly a gamma-ray imager using the coded-mask technique. These experiments contributed to our knowledge of annihilation radiation from the galaxy, the Crab Nebula and pulsar, and the black-hole binary object Cygnus X-1. These balloon experiments were training grounds for several graduate

students and postdoctoral researchers, whose careers were launched under Chupp's mentorship. Many remain in the field of high-energy astrophysics.

Chupp was a member of the American Physical Society, the American Astronomical Society, and the American Geophysical Union. He received numerous awards including the NASA Medal for Exceptional Scientific Achievement, NATO, Fulbright and Alexander von Humboldt fellowships, and fellowship in the Explorers' Club. He was a fellow of the American Physical Society and chair of the astrophysics division from 1992 to 1993, during which time he helped establish the Society's Hans Bethe Prize together with the Division of Nuclear Physics.

Chupp is predeceased by his wife Mary Chupp (1997) and is survived by three children, Timothy Chupp, Christine Greenwood, and Geoffrey Chupp, and by eight grandchildren.

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Citations

1. Chupp, E. L. (1976). *Gamma-ray astronomy: nuclear transition region*. [↗](#)
2. McConnell, J. P. M. R. D. (2018). *Edward Chupp*. *Physics Today*. <https://doi.org/10.1063/PT.6.4o.20180217a> [↗](#)