Robert Peichung Lin FREE

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Robert Peichung Lin

Robert Peichung Lin died suddenly from a stroke on 17 November 2012 in Berkeley, California. His titanic career in experimental space science spanned 50 years. He was known especially for his innovative experimental concepts and was widely considered to be the father of modern experimental high-energy solar physics.

Bob was born on 24 January 1942 in Kwangsi, China. During his childhood, his family moved first to London then to the US as his father established an academic career. In 1962 Bob graduated from Caltech with a physics degree and joined the physics graduate program at the University of California, Berkeley. He received his PhD in physics in 1967 with Kinsey Anderson as his research adviser and then joined the staff at Berkeley's Space Sciences Laboratory (SSL). In 1991 he became a professor in the physics department at Berkeley; he served as director of SSL from 1998 to 2008; and in 2011 he retired from teaching. Apart from a sabbatical year at ETH Zürich, Bob spent his entire professional career at Berkeley. He remained fully active in research after his retirement from the classroom.

When Bob arrived at Berkeley in 1962, Anderson's group was operating a vigorous program of rocket- and balloon-borne x-ray measurements. Anderson had just made the first measurements of the x rays associated with solar flares and of the x-ray spectrum of the aurora. The group was just starting to develop instruments for satellite missions, and Bob recognized quickly the enormous potential for that work. For his PhD thesis, he used Geiger–Müller tube experiments developed at Berkeley to make measurements of the spectrum of interplanetary electrons generated by solar flares.

In the early 1970s, Anderson and Bob convinced NASA to include a simple electron spectrometer on the lunar satellites launched by *Apollo 15* and *Apollo 16*. Bob used the instruments to analyze the remnant magnetic fields in the lunar crust by measuring 10- to 1000-eV electrons reflected by those fields. Later, using follow-on instruments on the *Lunar Prospector* and the *Mars Global Surveyor*, he and his students mapped the crustal magnetic field of the Moon and Mars. The NASA *MAVEN* (*Mars Atmosphere and Volatile Evolution*) mission, scheduled to launch in November 2013, carries a full payload of *in situ* instruments inspired by Bob's research on the interaction of the solar wind with Mars.

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Robert Peichung Lin

Bob's early work on solar-flare electrons led to instrument suites on the *ISEE-3* (*International Sun–Earth Explorer 3*; 1978), *Giotto* (1986), *Wind* (1994), and *STEREO* (*Solar Terrestrial Relations Observatory*; 2006). Bob and his students and collaborators used those instruments to study energetic electrons and ions associated with solar flares, coronal mass ejections, magnetic reconnection, and other space-plasma phenomena. He and his collaborators made the first measurements of *in situ* plasma radio-emission processes, diagnosed the source regions for particle energization in solar flares, measured the helical magnetic field-line length inside a coronal mass ejection, and studied the interaction of Comet Halley with solar wind, among many other things.

In the 1980s and 1990s, Bob's group flew balloon payloads with solid-state germanium detectors and sodium iodide and cesium iodide scintillator detectors to study hard x-ray and gamma-ray spectra of solar flares. He used those experiments to discover a class of microflares and to separate the thermal and nonthermal emissions. Meanwhile, another group had developed a balloon-borne imaging system with rotating modulation collimators to study solar hard x rays and gamma rays. Bob worked tirelessly for years to marry the two technologies for a space mission; the result was NASA's *RHESSI* (*Reuven Ramaty High Energy Solar Spectroscopic Imager*), launched in 2002. Bob served as the NASA principal investigator and led the science team with great enthusiasm. The mission's success and discoveries have led to the new instrument concepts currently being developed for and flown on sounding rocket flights and long-duration balloons.

For NASA's *STEREO* mission, Bob developed a simple solid-state particle detector, with a very good sensitivity to suprathermal particles, and found that the instrument was sensitive to energetic neutral particles created by charge exchange in Earth's magnetosphere. That led to his final effort on energetic neutral spectroscopy: the development of a small microsatellite—*CINEMA* (*CubeSat for Ions, Neutrals, Electrons, and Magnetic Fields*)—to study Earth's ring-current region.

Most recently, Bob had professorial appointments at Kyung Hee University in South Korea and Peking University in China and had begun new collaborations with groups in both countries to develop space-instrumentation expertise.

Bob was an inspiring and generous colleague and is remembered warmly by his students, postdocs, and collaborators. Throughout his career he received many professional honors, always with humility, but he was most at home at the Berkeley SSL or at his biweekly Chinese lunch with his friends and colleagues.

Stuart D. Bale
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