OBITUARIES

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Roger Wolfe Cohen

Roger Wolfe Cohen, a highly regarded physicist with major contributions to materials science and industrial management, died on 10 September 2016 in La Jolla, California, from complications from a brain tumor.

Born on 12 December 1939 in Perth Amboy, New Jersey, Roger received his BS in physics from MIT in 1960. He went on to obtain an MS in 1962 and PhD in physics in 1966 from Rutgers University and completed the executive program at Harvard Business School.

Roger spent 16 years at RCA Laboratories in Princeton, New Jersey, where he successfully demonstrated the first germanium–silicon thermoelectric power generator. The technology subsequently powered a series of spacecraft sent to explore the outer solar system. They include *Voyager 1* and *Voyager 2*, launched in 1977; *Galileo*, in 1989; *Cassini*, in 1997; and *New Horizons*, in 2006. The oldest power units in those spacecraft are approaching their 40th year of service. Roger also was a member of the team that developed the world's first commercial 10 tesla superconducting magnet, a major breakthrough in the industrial application of superconductivity.

Collaborating with Curtis Carlson, Roger developed an information-theoretic description of the human visual system in 1978 and used it to design software that simulates the human ability to perceive differences in displayed images. That work led to many commercial pattern-recognition and image-quality applications, and it earned its makers several awards, including a special Emmy Award for improved high-definition television and in 2006 the Society for Information Display's first Otto Schade Prize for outstanding scientific achievement in the advancement of functional performance and image quality of information displays.

In 1978 Roger moved to Exxon Corporate Research Laboratories, where he organized and built Exxon's first research laboratory in theory and modeling. He became lab director and then senior director of Exxon corporate research in 1984, with responsibility for half of the corporation's basic research activities.

Roger Wolfe Cohen

In the late 1980s, Roger turned to technology development. He formed a group to develop and commercialize technology for retail marketing. His team demonstrated the world's first retail vehicle-recognition and payment technology, which evolved into the current Speedpass system. After becoming manager of research planning and programs, Roger initiated and deployed new strategies for key technology assets in energy. They resulted in the development of new high-strength steels for gas pipelines, partnerships to advance fuel cells for transportation applications, novel technologies to find and produce hydrocarbon resources, and technologies for environmental bioremediation. He established the first-in-industry competitive technology program and developed and implemented program-planning systems for new science.

While at Exxon, Roger initiated the industry's only basic-research effort on climate change. His team participated in worldwide scientific efforts to better understand climate, and team members were lead authors of key chapters in reports for the Intergovernmental Panel on Climate Change. Having more time to study details of climate science after he retired in 2003, Roger became increasingly more questioning about claims that additional carbon dioxide levels from human activities would be harmful. Part of the reason for his change of heart was that he found smaller observed warming than what had been predicted by most climate models. Another reason was the enhanced greening of Earth from more CO_2. However, always open to cogent new arguments, he helped found the CO_2 Coalition to study the matter further and served on its board.

Roger was a founding member of the American Physical Society's Topical Group on the Physics of Climate, and his work there demonstrated his deep drive for getting at the truth. For example, Roger carefully considered and recruited knowledgeable speakers for the group's initial forums. A source of tremendous integrity, Roger was an uncompromising believer in the core APS principle that "honesty must be regarded as the cornerstone of ethics in science."

Roger's integrity made a similar impression on his coworkers. His strongly expressed views in many areas were backed up by his critical analysis. Although those firmly held beliefs alienated many who disagreed with him, Roger would not let that prevent him from being open to new ways of thinking about an issue. A case in point is that despite his firm opinion that CO_2 was not a problem, he helped establish Global Thermostat, a company that has developed technology to capture CO_2 from the air and from flue gas. Its business model is to sell the CO_2 profitably to make synthetic fuels, chemicals, plastics, and even carbon fiber.

Roger had approximately 50 publications and five US patents in the areas of materials, electronic devices, energy, the human visual system, and technology management. He served on Visiting Committees in the physics departments at the University of California, San Diego, and the University of Texas at Austin.

Roger spent most of his leisure hours with a yellow pad and pencil, working out physics equations. But he also managed to collect exotic cars, and he loved to drive them fast.

We will long remember his friendship, courage, and wise counsel.

Peter Eisenberger
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New York City

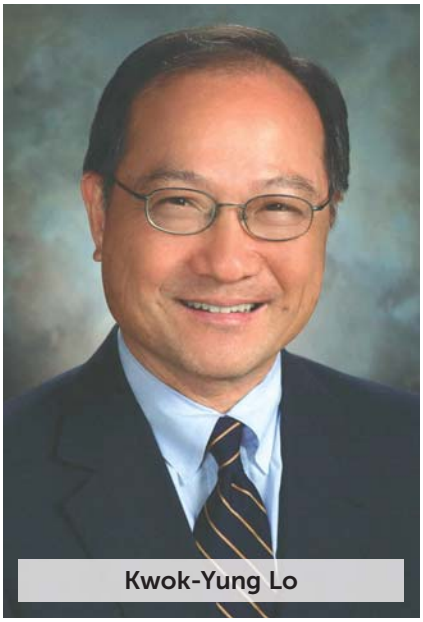
Martin P. Fricke
San Diego, California
Laurence I. Gould
University of Hartford
West Hartford, Connecticut
William Happer
Princeton University
Princeton, New Jersey

Kwok-Yung Lo

Radio astronomer and physicist Kwok-Yung "Fred" Lo was born on 19 October 1947 in Nanjing, China. The third of six sons, he grew up in Hong Kong, where his father had moved his antique business in 1949 in search of better opportunities. Fred came to the US in 1965 to attend MIT, where he earned his BS in 1969 and a PhD in 1974, both in physics. His thesis, titled "Interstellar microwave radiation and early stellar evolution," was supervised by radio astronomer Bernard Burke.

Fred's postdoctoral years were spent in California, first at Caltech starting in 1974 and then as a Miller Fellow at the University of California, Berkeley, in 1976. He returned to Caltech as a senior research fellow in 1978, and he was appointed as an assistant professor of astronomy in 1980. Fred's wide-ranging research interests included cosmology, the galactic center, megamasers, star formation, and starbursts. With Burke and others, he spearheaded very long baseline interferometry (VLBI) studies of H_2O and OH maser-emission regions. He also led the first VLBI effort to detect compact structure in Sagittarius A*, the radio source associated with the supermassive black hole at the center of the Milky Way. His numerous other VLBI studies of Sgr A* involved many collaborators.

NATIONAL RADIO ASTRONOMY OBSERVATORY



Kwok-Yung Lo

At Caltech's Owens Valley millimeter-wave array, Fred was instrumental in refining its science goals, testing the array, and conducting the first observations as it began operation. He led the team that produced the first millimeter-wave interferometric map of carbon dioxide emission from another galaxy, IC 342. At the same time, working with Mark Claussen, he was the first to suggest that the luminous water maser emission from external galaxies is circumnuclear, is affiliated with active galactic nuclei, and could serve as a high-resolution probe of those nuclei. Their insights became the foundation for the Megamaser Cosmology Project.

Fred joined the University of Illinois at Urbana-Champaign's (UIUC's) astronomy department as a full professor in 1986. There he established a millimeter and submillimeter receiver laboratory in collaboration with UIUC's solid-state-physics program. That partnership produced the first superconductor-insulator-superconductor junctions used in the Berkeley-Illinois-Maryland Association millimeter array. A similar UIUC–University of Chicago collaboration led to the development of novel receivers for the South Pole Telescope. Later, as chair of the astronomy department, and conscious of a critical need to increase interest in astronomy among freshman students, Fred developed a course in which students visited professors' homes to discuss hot topics in astronomy and astrophysics in an informal atmosphere. He was also aware of the benefits of greater diversity and made considerable efforts to increase the representation of women on the UIUC faculty.

Fred left UIUC for Taiwan in 1990 to join the core group that founded what became the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA). Among its other cofounders were Paul Ho, Typhoon Lee, Frank Shu, and Chi Yuan. Fred was deeply committed to the institute and served as its director from 1997 to 2002. During his leadership of ASIAA, Taiwan's participation in some of the most important radio astronomy projects around the globe expanded remarkably. In 1998 Fred was elected as an ASIAA academician and appointed as a professor of physics at the National Taiwan University.

Fred became director of the National Radio Astronomy Observatory (NRAO) in September 2002 and served until May 2012. During his tenure, the NRAO completed the rebuilding of the 1970s-era Very Large Array as the much more powerful Karl G. Jansky Very Large Array. At the same time, coordinating with international partners, Fred managed the North American share of both the construction of the Atacama Large Millimeter/Submillimeter Array and the startup of its science operations.

Starting in 2014, Fred became an adviser to Astron Solutions Corp, a company founded by Frank Shu that aims to mitigate climate change by using molten-salt technology. Having grown up in Hong Kong, Fred had many friends and influential contacts in both the academic and private sectors; he was especially effective in connecting Astron to potential research and commercial partners. With a ready smile and a cheerful demeanor, Fred was welcome wherever he went.

Although he often began the day with Tai Chi, Fred was more given to action than meditation. He was a continual source of ideas and grew impatient when they were not promptly achieved. You knew where you stood with Fred, what he thought, and why. Even though he pushed his colleagues hard, no one questioned his motivation—excellence in science. He would ask piercing questions during meetings and discussions, but in private—particularly with younger researchers—he would patiently provide clarification. Sadly, he had no time to pursue his long-held dream of uniting all the major observatories of pan-Pacific countries into one international organization. Fred died on 16 December 2016 in Charlottesville, Virginia, of complications from lung cancer.

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