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Hui-Chun Liu

Hui-Chun Liu

Known for his groundbreaking work with semiconductor quantum devices, Hui-Chun Liu passed away on 23 October 2013 at age 53 in Shanghai, China; he had taken a bad fall and was in a coma the last nine days of his life. His sudden and unexpected death is a shock to the physics community.

Known to colleagues as H. C., he was born in Taiyuan, China, on 26 March 1960. He received his BSc in physics from Lanzhou University in 1982. After successfully passing the selection process for the second-year China–US Physics Examination and Application program, H. C. went to the University of Pittsburgh, where he received his PhD in applied physics in 1987 in the group of Darryl Coon. His major research interests were semiconductor nanoscience and quantum devices.

H. C. joined the Institute for Microstructural Sciences of the National Research Council Canada as a research associate in 1987 and rose rapidly through the ranks. In 1998 he was named to lead the council's terahertz and imaging devices group, and in 2000 he became a principal research officer—the highest rank, reserved for very few. In 2011 he returned to China to take a position at Shanghai Jiao Tong University, where as a chair professor he put together a new research group. H. C. had been recruited through the "1000 talents" program, which brings top minds to China from overseas. He founded two high-tech companies in China: Debut Optoelectronic Sensor in Wuxi and Ghopto Shanxi Guohui Optoelectronic Technology in Taiyuan.

Among H. C.'s honors were the Herzberg Medal from the Canadian Association of Physicists in 2000, the Bessel Prize from the Alexander von Humboldt Foundation in 2001, and the Jiangsu provincial high-level innovation-entrepreneur talent award in 2011. H. C. was granted more than a dozen patents, wrote or cowrote more than 380 articles in refereed journals, and gave 95 invited presentations at international conferences.

When H. C. was still in graduate school in the 1980s, the field of intersubband transitions in semiconductor quantum wells was born. H. C. was one of the founders of the field of quantum-well infrared photodetectors (QWIPs). As a junior researcher at National Research Council Canada, he started a world-leading research program on QWIPs. The ultrafast QWIP technologies he developed are being used in leading research laboratories and industries, including Harvard University, ETH Zürich, and Northrop Grumman. His patented upconversion pixel-less imagers have attracted considerable attention, as has his pioneering extension of QWIPs into the terahertz spectral region.

H. C.'s name has become synonymous with QWIP. He edited two volumes of the series Semiconductors and Semimetals and wrote a monograph on QWIPs. He served as chair or cochair of various QWIP workshops, was twice chair of the International Conference on Intersubband Transitions in Quantum Wells, and was a member of several steering and advisory committees overseeing the strategic development of terahertz technology in China.

In addition to his laying the foundations for the field of QWIPs, H. C. demonstrated two-photon absorption in QWIPs, studied various nonlinear optical phenomena through intersubband transitions, and developed an intersubband Raman laser. Early in his career, he did innovative analysis on resonant tunneling diodes. More recently, he had focused on terahertz quantum cascade lasers and, with his collaborators, achieved a record-high operating temperature, which is significant, since increasing the lasers' operating temperature is the most important challenge in the field.

H. C. was like a brother to many of his colleagues around the world. A unique leader, he was generous with and fiercely protective of his staff, was attentive to their well-being, and knew instinctively how to draw out the best skills of each team member. He instilled a sense of common purpose in all. His calm and positive demeanor greatly influenced his colleagues and especially his students.

H. C.'s unfailing support and loyalty will be deeply missed, and he will always be fondly remembered.

We thank Chao Zhang (University of Wollongong) and Jun-Cheng Cao (Shanghai Institute of Microsystem and Information Technology) for their numerous contributions to this obituary.

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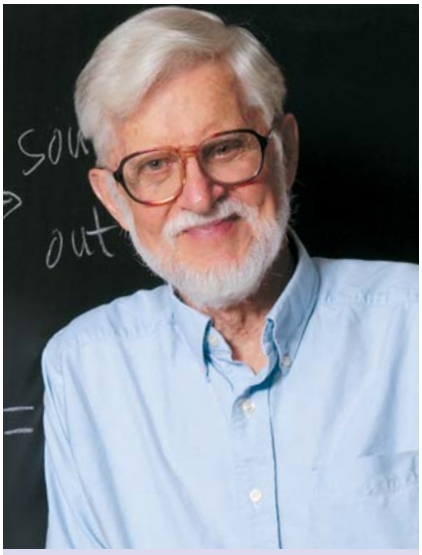
Kenneth Noble Stevens

On the day in 1954 when Kenneth Noble Stevens was first appointed at MIT as an assistant professor, no one could have predicted the number of scientific careers he would launch, the way he would transform the thinking of his students and colleagues, or the breadth of his influence on acoustic phonetics and beyond. He was a member of the MIT faculty for more than half a century and supervised at least 50 PhD students and an untold number of master's students, undergraduates, postdoctoral fellows, and visiting scientists. His first PhD student was James Flanagan in 1955, and his last one was Youngsook Jung in 2009.

Being in Ken's speech communication laboratory was an extraordinary experience. The lab was full of energy


GREG HREN PHOTOGRAPHY/RLE AT MIT

Kenneth Noble Stevens

and brought together researchers from many disciplines related to speech—linguistics, psychology, acoustics, computer science, physiology. That started in the 1960s, a time when multidisciplinary research was not the norm in either academia or industry. Ken was also unique for his time in that he supervised a substantial number of female graduate students. Of the first 20 women who received PhDs in electrical engineering and computer science at MIT, 4 were Ken's students, and of the doctoral students he supervised, 23 were women.

Ken was a gentle and rigorous mentor, and he met regularly with his students and postdocs. As Haruko Kawasaki, a former postdoc of his, says, "What struck me most about Ken at these meetings was his being an exceptionally good listener." He had a low-key manner, yet when something was not right, he would let his students know, sometimes by simply raising one eyebrow! Patti Price, another former postdoc, recalls Ken telling her, "When you measure productivity and a student is involved, you have to count both products: the progress of the research and the progress of the student." His legendary support of students is reflected in his reluctance to put his name on their papers even though he would spend uncounted hours discussing the work and editing successive drafts.

The depth of Ken's understanding of science formed an indelible imprint on his students and colleagues and became a model for those who pursued scientific careers; thus Ken's influence reached far beyond any particular time and place. He was creative yet meticulous in his attention to understanding and explaining every detail of a model or of a physical mechanism. He also used words with great precision. It is no surprise, then, that his 1998 book *Acoustic Phonetics* (MIT Press), which became a classic overnight, took more than 20 years to complete.

Among the seminal intellectual contributions Ken made is the quantal theory of speech production, a theory that relates the underlying sound categories of language to the acoustics, physiology, and physics of the vocal tract. Another contribution is his 2002 model of speech perception based on feature cues such as landmarks. His long-term collaborations with Gunnar Fant, Morris Halle, Sheila Blumstein, Jay Keyser, and other colleagues led to important papers and lively debates on such issues as analysis-by-synthesis, invariance, distinctive features, lexical access, and feature enhancement. He also treasured his friendship and collaboration with Amar Bose, with whom he wrote a book on introductory network theory in 1965. In addition to developing theories of speech production and perception, Ken also helped create several speech-processing systems, including the KlattTalk (with Dennis Klatt) and HLsyn speech synthesizers, articulatory synthesis, automatic speech recognition (especially using acoustic landmarks), and speech-training methods for deaf children.

The Acoustical Society of America (ASA) was an important part of Ken's career, and he believed it was the appropriate venue for promoting, discussing, and publishing all things related to speech acoustics. He served as a member of the ASA executive council in 1963–66, as vice president in 1971–72, and then as president in 1976–77. In recognition of his scientific contributions and influence, the ASA awarded Ken its Silver Medal in Speech Communication in 1983 and its Gold Medal in 1995. In 1999 President Bill Clinton awarded Ken the National Medal of Science "for his leadership and pioneering contributions to the theory of acoustics of speech production and perception, development of mathematical methods of analysis and modeling to study the acoustics of speech production, and establishing the contemporary foundations of speech science."

Ken was devoted to his family and six children. An avid fan of the outdoors, he took great pleasure in biking, hiking, skiing, and working on his house in Maine with family and friends. He loved classical music, ice cream, and fish chowder, and was a well-tested cook of lasagna and chili.

Ken was born on 24 March 1924 in Toronto. He received his BA and MA in engineering physics from the University of Toronto in 1945 and 1948, respectively, and his ScD in electrical engineering from MIT in 1952. His dissertation was entitled "Perception of sounds shaped by resonance circuits." His adviser was Leo Beranek. Ken died in Clackamas, Oregon, on 19 August 2013 of complications due to Alzheimer's disease. For those of us who knew him, he will always be present in our thoughts, our work, our lives, and our teaching.

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