



## IN MEMORIAM

William Barnes Arveson  
Professor of Mathematics, Emeritus  
UC Berkeley  
1934 - 2011

Bill Arveson died on November 15, 2011, due to complications from anesthesia during hip surgery. He was a leading expert and a deeply original researcher in the theory of operators and operator algebras, areas with close ties to physics, especially to quantum theory.

Bill was born in Oakland, California, on November 22, 1934. His parents divorced when he was just a year old and moved separately to southern California, leaving Bill in Oakland in the care of his maternal grandmother. Bill's mother remarried when Bill was about high school age, at which point he moved to San Gabriel, California, where he attended Alhambra High, graduating in 1952.

After high school Bill enlisted in the U.S. Navy. He did so well on a placement test that he pretty much had his choice of naval jobs. He chose to study radar technology. After training he spent three years on an aircraft carrier in the Pacific as the carrier's ace repairman. At the end of his naval service Bill took another placement test and again did so well he was encouraged to make a career of the Navy. He decided instead to try college.

Bill attended Pasadena City College for two years. On the basis of his excellent performance on another test, he qualified for one of two slots reserved for transfers to the California Institute of Technology. He graduated from CalTech with a B.S. in Mathematics in 1960, whereupon he entered the graduate mathematics program at the University of California, Los Angeles. He earned his M.A. in 1963 and his Ph.D. in 1964. While at UCLA Bill maintained his Navy connection, serving as a Mathematician G7 in 1960-1961 and as a Mathematician G12 in fall 1965, at the Naval Undersea Research and Development Center in Pasadena, California.

After receiving his Ph.D. in fall 1964, Bill stayed at UCLA in spring 1965, as an Acting Assistant Professor. In the period 1965-1968 he served as a Benjamin Peirce Instructor at Harvard University. UC Berkeley hired Bill as a Lecturer in Mathematics in 1968, but quickly promoted him to Associate Professor in 1969, and then to Professor in 1974. Bill became Emeritus Professor upon his retirement in 2003.

When Bill began his graduate studies, the subject of operator algebras, spearheaded by the famous John Von Neumann, was in full bloom. Notably, the basic theory of two classes of such algebras, called  $C^*$ -algebras and Von Neumann algebras, had been worked out. The algebras in both classes possess a property called self-adjointness. Guided by his earlier studies of Fourier analysis and the then emerging theory of function algebras, Bill had the prescient insight that non-self-adjoint operator algebras are worthy of study. He set out to develop a theory of such algebras, and much of his early work focused on this project. For a few years he was on his own in this endeavor, but gradually others attracted to his new ideas joined him. The subject of non-self-adjoint operator algebras became and remains a flourishing branch of mathematics. In addition to

Bill's contributions, the subject has been well nourished by some of the 29 students who wrote doctoral dissertations under his direction, by some of the students of those students, and by many of the postdocs who came to Berkeley to work under Bill's mentorship (as well as by a large number of other operator theorists).

Bill's subsequent work in operator algebras is marked by many surprising discoveries, establishing him as a world leader in this area. For example, Bill pioneered the exploration of certain mysterious structures that arise in a basic way from the modeling of irreversible dynamics of quantum systems, such as those involving particle creation and annihilation. In the 1990s he opened a new front with highly original ideas for applying seemingly unrelated aspects of operator algebras to the efficient calculation of important quantities in quantum physics. His productivity continued unabated during the final decade of his life (including a significant paper published in 2010), and began to include applications of quantum spaces to quantum information theory and quantum computing.

Bill was a masterful expositor of mathematics, very particular about English usage. The mathematical structures he dealt with were often formidably complex, yet his explanations were always lucid, with no loose ends. In addition to his 70+ research papers, he enriched his field through several monographs, and through many informal lecture notes he made available to anyone interested (including in latter years by posting them on his home webpage). He was also a featured lecturer at many conferences throughout the world.

Bill was the principal investigator for grants from the National Science Foundation during most of his Berkeley years. In the Academic Years 1985-1986 and 1999-2000 he held a prestigious Miller Professorship. He won a Guggenheim Fellowship for 1976-1977, and was National Research Council Research Fellow for June and July of 1971 at the University of Newcastle, England. Bill was a Visiting Professor at Aarhus University, Denmark, during the Academic Year 1973-1974, and at the University of California, San Diego, in 1974-1975. He was invited to spend shorter periods at many other mathematics departments, ranging from Asia to the U.S. to Europe to South America to Israel.

Bill served the mathematics community as an editor of several major journals: Principal Editor of the Journal of Operator Theory, Consulting Editor of the Journal of the Edinburgh Mathematical Society, Associate Editor of the Bulletin of the American Mathematical Society, Associate Editor of the Duke Mathematical Journal. He also served a term as treasurer of the Pacific Journal of Mathematics.

Bill's university service was mainly at the departmental level. He was his department's Undergraduate Vice Chair in 1971-1972. At various times he served on his department's Preliminary Examination Committee, Graduate Admissions Committee, Graduate Appointments Committee, Faculty Appointments Committee, and Faculty Advancement Committee. All are time-consuming assignments.

Bill was a demanding and an effective teacher, especially at the upper division and graduate levels. The students who wrote their dissertations under him adored him. This was brought home at a memorial service for Bill at the Berkeley Faculty Club on February 19, 2012. Many of Bill's former students, now located in the U.S. and Canada, attended. Others who could not make the trip sent messages to be read to the attendees. All described in moving terms how Bill had influenced their lives through his high standards, his concern for their welfare, and his generosity.

A common thread in people's memories is that Bill was much more than a great mathematician. Former students of Bill, upon learning of his death, sent the remarks below to Bill's widow.

I used to think it unfair that someone could be so supremely talented both technically and socially.

So many of us really loved and admired that man. He was one of the people who convinced me that a mathematician could be brilliant while being a wonderful human being.

Bill was a legendary figure to people my age, but you'd never know it from the way he treated people. Indeed, I could never decide which part of Bill I respected most -- amazing math talent or down-to-earth genuinely nice person. But now that I think about it, I respect the fact that he was both at the same time. What a rare and beautiful human being.

Bill rose from modest means. His parents were not wealthy and did not encourage him in academic pursuits. After high school Bill set his own path. The qualities that made him a leader in his field were his fierce

independence, his intricate mastery of the technical aspects of his subject, and, most important, his global grasp of the subject, coupled with the insight and the boldness that led him to explore uncharted territory.

After his retirement Bill continued to work on mathematics every day, mostly at home. His wife, Lee Ann, tells us that at lunchtime each day he liked to take a break from mathematics to read biographies, historical texts, or books about the follies of modern politics and ambition. Bill had received an impressive classical education at CalTech, and his reverence for education and learning defined him. A critical and independent thinker, he resisted heavy-handed authoritarians and paternalistic movements and proclamations.

Bill was a lover of jazz, and taught himself how to play jazz saxophone while serving on the aircraft carrier. From his time in southern California he acquired a love of movies, and went to a matinee every Sunday. Bill and Lee Ann were aficionados of miniature dachshunds, raising a succession of them, and they especially enjoyed taking their dogs with them on holidays to Sea Ranch.

As a teacher, friend, father, husband, as well as a community member, Bill was extremely generous of his time and purse. He was a very happy and optimistic person, never expressing any regrets.

Bill is survived by Lee Ann Kaskutas, his wife of 26 years, by sons Jeffrey and Robert from a previous marriage, and by his beloved dog Dual Champion Cherry Creek's Bronco.

Marc Rieffel  
Donald Sarason  
2012