

# Ralph Bolgiano, Jr.

*April 1, 1922 — May 11, 2002*

Ralph Bolgiano, Jr., Professor Emeritus in the School of Electrical and Computer Engineering, died at Kendal in Ithaca on May 11, 2002 from complications following a bicycle accident several weeks before. He is survived by his wife, Elizabeth; four children: Randy of Wyoming, Douglas of Seattle, Christopher of Ithaca, and Elizabeth of Princeton; their partners; five grandchildren; and a sister, Charlotte Oliver, of Locust Grove, Virginia.

Ralph was born and raised in Baltimore, Maryland, matriculated at Cornell University as a McMullen Scholar in 1940, received the B.S. degree in 1944, the B.E.E. degree in 1947 after serving as an officer in the U.S. Army Signal Corps during World War II, and the M.E.E. degree in 1949. Subsequently, he worked for the General Electric Company as a Development Engineer until he returned to Cornell as a graduate student and completed his Ph.D. degree in 1958. In the same year, Ralph was invited to join the faculty as an Associate Professor in the School of Electrical Engineering, and was promoted to full Professor in 1968.

Ralph did his Ph.D. work at Cornell University in the School of Electrical Engineering (now the School of Electrical and Computer Engineering) under the direction of Professor W.E. Gordon. His 1958 thesis, entitled “A meteorological interpretation of wavelength dependence in transhorizon propagation,” had a major impact on the then new field of over-the-horizon propagation via radio wave scattering from turbulent irregularities in the refractive index of the atmosphere. This work, in particular, dealt with the importance of buoyancy forces and how the associated added term in the nonlinear Navier-Stokes equation altered the spectral shape of the turbulence, i.e. how the strength of the turbulent irregularities decreases with decreasing wavelength. Radio wave scattering is controlled by a distinct wavelength (determined by the radio frequency and the scatter geometry), and so it is crucial to know what physical parameters control the wavelength spectrum and, in particular, what the short wavelength “cut off” is, since there will be very little scatter at radio frequencies requiring wavelengths shorter than this. In other words, there is a high frequency cutoff in the scatter process, and the buoyancy forces are important in determining this cutoff. All of Ralph’s subsequent research built upon and expanded on his thesis work, dealing with various aspects of turbulence in the atmosphere, anisotropies in tropospheric structure, and the interaction between radio waves and atmospheric turbulence, including transhorizon radio propagation.

For years, Ralph was associated with the Cornell Center for Radiophysics and Space Research and his sabbatical leaves were directly related to his research interests. In 1964-65, as a Guggenheim Fellow and Fulbright Travel

Fellow, he was a Visiting Research Scientist at l'Institut de Mechanique Statistique de la Turbulence, Universite d'Aix en Provence, Marseille. In 1971-72, he was Research Engineer at the Radio and Space Research Station at Ditton Park, Berkshire, England. In 1979-80, he did research in his field at the University of Colorado.

Ralph was a Senior Member of the Institute of Electrical and Electronics Engineers, a Fellow of the American Association for the Advancement of Science, as well as a member of the IEEE Antennas and Propagation Society, the American Geophysical Union, and the American Meteorological Society.

During his faculty career in the School of Electrical Engineering, Ralph taught a wide variety of courses. At the graduate level, he taught courses based on his research interests in electromagnetic wave phenomena in the atmosphere, as well as a course on radio systems engineering. In his early years on the faculty, Ralph taught several courses on electrical circuits to non-electrical engineers. At that time, most of the undergraduate students in the College of Engineering were required to take a course in electrical engineering as part of their curriculum, and these courses were specially tailored to meet their needs.

During the early part of the 1960s, Henry Booker, then Director of the School of Electrical Engineering, led a thorough renovation of the Electrical Engineering curriculum. As part of this, he developed a two-semester course in Electrical Science to be taught to all electrical engineering students at the sophomore level. Ralph was a participant from the beginning, and he taught this course and its successors several times throughout his career. He also was involved with the development of a two-semester, junior-level, required sequence of laboratory courses. These courses required the participation of several faculty members and overseeing the operation was a considerable task. Over the years, Ralph was in charge of one, or both, of these laboratory courses many times, and he was highly successful in directing the operation.

As part of the renovation of the curriculum, a two-semester sequence of courses on electromagnetic fields and waves was developed. These courses, previously only taught at the fifth year level, were designed for juniors. Ralph was a major participant in the development of this sequence and over the years, he taught one or the other of these courses many times.

In all of Ralph's courses, students could expect exacting requirements, carefully developed lectures of outstanding clarity, thought-provoking problems, and challenging examinations. Indeed, faculty members who helped in teaching courses with Ralph were also frequently challenged by the problems he set. Ralph, however, was a popular teacher and greatly appreciated by students for his dedication to their education. As a consequence, Ralph was

the first recipient, in 1983, of the Ruth and Joel Spira Excellence in Teaching Award. He was also the co-winner of the Student Teaching Award for the School of Electrical Engineering in May 1985. Teaching was a major focus of Ralph's life, and he loved to interact with students. He set high standards, and was dedicated to meeting them. Ralph accepted the challenges of student advising with characteristic integrity. He always took the opportunity to enrich this interaction with students by giving his time and wisdom unselfishly. Similarly, Ralph accepted election as Graduate Field Representative of the School several times, again giving of his time for the benefit of others.

Throughout his life, Ralph was an avid sailor. From boyhood, he sailed and raced his Star Class sailboat first on Chesapeake Bay and later on Lake Cayuga. He had a natural sense for the rhythm of the water, wind and boat, and was a true "seat of the pants sailor." Ralph was a welcome guest on others' boats and successfully passed his love of sailing to his children. Ralph was also an enthusiastic bicyclist who explored much of Tompkins County on his bike and through the years cycled around the Lake and developed an impressive knowledge of the County roads and highways. After retirement from Cornell, Ralph became an active member of the Cayuga Heights Volunteer Fire Department and accepted the responsibilities thereof with characteristic devotion. At the Memorial Service held at Kendal in his honor, the presence of two Fire Department trucks and many of his fire fighting comrades was a tribute to Ralph as a valued fellow volunteer and friend.

Above all, everyone whose life Ralph touched remember him as a true gentleman.

*Donald T. Farley, Paul R. McIsaac, George J. Wolga*