



IN MEMORIAM

Charles K. (Ned) Birdsall
Professor of Electrical Engineering and Computer Sciences, Emeritus
UC Berkeley
1925-2012

Charles Kennedy (Ned) Birdsall, Professor Emeritus in the Department of Electrical Engineering and Computer Sciences (EECS) at the University of California, Berkeley, and a pioneering inventor and educator in microwave tubes and plasma physics, died Tuesday, March 6, 2012, at his home in Lafayette, California. He was 86.

Born on November 19, 1925 in Manhattan, New York, Ned Birdsall graduated from the University of Michigan with bachelors and master's degrees in electrical engineering. At Michigan, Ned was on the varsity track team and was a champion Big Ten 2- mile runner. He participated in the Naval V-12 program, as well as being a member of the marching band. He then went west to Stanford University, where he received his PhD in electrical engineering in 1951 under the direction of Professors Les Field and Marvin Choderow. During this time he held Sylvania and RCA fellowships. His thesis on the "Interaction of Two Electron Streams for Microwave Amplification" was an important development in microwave amplification, and later in the understanding of plasma instabilities.

After graduating, he spent the next nine years in research labs at Hughes Aircraft and General Electric, during which time he invented and developed various microwave devices, including the resistive wall amplifier and the ring- bar structure traveling wave tube. This work led to the granting of 27 patents and his election in 1962 as a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) at the age of 36. In 1959, Ned joined the EECS Department at Berkeley, beginning a four- decade academic career in which he made fundamental advances. First, his work in electron beam plasma physics, where he and a PhD student discovered virtual cathode oscillations, led to a monograph, *Electron Dynamics in Diode Regions* [C.K. Birdsall and W.B. Bridges, Academic Press, (1966)]. Subsequently he carried out important work in the plasma sciences, both in research and in teaching. He was one of the early developers of many- particle plasma simulation, notably the particle- in- cell (PIC) concept, and its applications to bounded- plasma simulations. Together with his students and post- docs, these codes have been developed to be easily and readily available for general use. Both in his teaching and research he always insisted on the widest dissemination of all developments by himself and his students. His book, *Plasma Physics via Computer Simulation* [C.K. Birdsall and A.B. Langdon, McGraw Hill (1985)], has attained a classic status for introducing students and researchers to the field. Ned held a Miller Research Professorship in 1963-64 to advance this work.

In recognition of his pioneering developments in microwave devices and plasmas Ned received many honors, including the IEEE Plasma Science and Applications Committee (PSAC) Award, 1988; the Dawson Award, 2003, given at the International Conference on Numerical Simulation of Plasmas. He was selected as the inaugural recipient for the IEEE Marie Skłodowska- Curie Award in 2011, cited "for theoretical

investigations and fundamental discoveries involving microwave tubes, electron beam physics and particle-in-cell simulation of plasma physics.”

Ned was always an enthusiast, both in his research area of plasma simulation and for his interests in the wider academic and world stage. In the former area, he organized the Plasma Theory and Simulation Group to highlight its importance in solving plasma problems, and was never hesitant in promoting its use. Over his long tenure at UC Berkeley, he supervised 32 PhD students and about a dozen post-docs. Many became leaders in their fields, including two who were given both the American Physical Society Maxwell and Alfen prizes.

In the 1970s Ned realized that, although his research related to fusion plasmas was important towards achieving a sustainable long-term energy future, there were more immediate problems concerned with energy supply and the impacts of energy use on the environment. He also knew that solutions would involve a combination of technical, economic, and policy considerations. To address these questions in an academic setting, he chaired an interdisciplinary campus committee recruiting faculty from a broad range of disciplines. After meeting for almost a year, the group concluded that a graduate group would be the best mechanism for interdisciplinary research. They developed a curriculum based mainly on existing classes, but also recommending a few new interdisciplinary courses. Ned met with Vice Chancellor Mark Christenson, who was overseeing the efforts of the committee, and they came up with a radical proposal for an “augmented” graduate group which would have a core faculty and would report directly to the Vice Chancellor. The first core faculty member was John Holdren, who arrived as an Assistant Professor of Energy and Resources in 1973, and the Energy and Resources Group, ERG, was born. ERG has become a premier place to do interdisciplinary energy research with eight core faculty, approximately 70 graduate students, and over 400 alumni. Ned was always very proud and supportive of what he had worked so hard to bring into being. Principally for this effort, he was awarded the Berkeley Citation in 1991.

Ned retired in the early '90s but continued to do plasma research and supervise students for the next 15 years. He loved life, people, and being active. He thought of his students as family and championed them. He was very supportive of women scientists, always having at least one in his group. One of his great pleasures was to invite students to his house for BBQs and volleyball games. He enjoyed hiking and cross country skiing in the Sierra and in Austria, ran with the Orinda Roadrunners, and competed in 10k races and in eight marathons, two in Boston, the last at age 74. When age and injuries slowed him down, Ned became an avid biker. He was a reader, a talker, and a writer who spoke up for his beliefs and wrote letters to the editor to express those beliefs. Ned enjoyed music, always went to noon concerts with his colleagues, and sang with the Faculty Club Monks. He was a happy, generous, caring man, truly gifted with a passion for living.

Ned is survived by Ginger, his wife of 30 years, daughter Barbara Hagen, sons Tom and John Birdsall, Ginger's children Michele Proffitt, Andrew Pletcher and Sandra Glendinning, along with eight grandchildren and one great grandchild. He was preceded in death by daughters Anne and Beth.

Michael
Lieberman

Allan Lichtenberg
Theodore Van Duzer