Donald R. Yennie

March 4, 1924 — April 14, 1993

Donald R. Yennie, professor of physics at Cornell University, died on 14 April 1993 at the age of 69. He was an internationally recognized authority on quantum electrodynamics, the fundamental theory of the interaction between matter and electromagnetic radiation. He will be remembered not only as a leader in the most difficult and precise aspects of this field, but also as a beloved teacher and friend to his many students and colleagues.

Don was born in Paterson, New Jersey in 1924. During World War II he served in the Navy, and was an undergraduate at the Stevens Institute of Technology. He graduated in 1945 with an M.A. degree, and was an instructor in physics at Stevens during 1946-47. In 1951, he earned his Ph.D. degree from Columbia University as a student of Hideki Yukawa. He then joined the Institute for Advanced Study in Princeton. From 1952 until 1957, he was first an instructor and then an assistant professor at Stanford University. He then moved to the University of Minnesota, and, in 1964, was recruited by Hans Bethe and the theory group to join the physics faculty at Cornell University. He was an NSF Senior Fellow, a Guggenheim Fellow, and a Fellow of the American Physical Society. He served as a visiting professor at the University of Paris, the University of California (Santa Barbara), Fermilab, and SLAC, and held an Alexander von Humboldt Award at the University of Heidelberg at the time of his death.

Don's work covered a wide range of topics in theoretical physics. He had a strong interest both in fundamental questions about quantum field theory and in applications of field theory to experimental data.

While at Stanford, Don developed much of the theoretical formalism needed to interpret Robert Hofstadter's Nobel-Prize-winning experimental studies of elastic collisions between electrons and nuclei. This work led to important new insights into the internal structure of protons and neutrons. Don's review article, written in 1957 with M.M. Levy and D.G. Ravenhall, was a standard reference in this field for years. At the same time, he pioneered the theoretical analysis of inelastic electron collisions. His paper, with R.H. Dalitz, laid the groundwork for this subject which has since generated hundreds of papers.

One of Don's most influential papers was written in 1961 with S.C. Frautschi and H. Suura. It provided the definitive resolution of the infrared-divergence problem in quantum electrodynamics. This work completed the earlier effort by F. Bloch and A. Nordsieck, putting the analysis on a solid quantum-field-theoretic basis, and providing the technical tools needed to extract meaningful answers from quantum electrodynamics to any order in perturbation theory. It was the final ingredient in the formal development of quantum electrodynamics, a theory, confirmed

by experiment, that is among the foundation stones of modern physics. In recent years, the techniques developed and refined by Don for this problem have been successfully applied in quantum chromodynamics, the theory of subnuclear interactions, to show how long-wavelength contributions factor from short-wavelength contributions in high-energy hadronic amplitudes.

Don's incomparable technical skills, together with his profound understanding of quantum field theory, are well illustrated by his many difficult and precise calculations of the properties of simple atoms in quantum electrodynamics. His analyses, particularly of the Lamb-shift and hyperfine splittings in hydrogen and muonium, remain among the most challenging ever attempted in quantum field theory. They are essential for the experimental verification of quantum electrodynamics, and have provided a starting point for a generation of researchers in this field. Don was still actively involved in such work at the time of his death.

Don was always deeply interested in experimental results, as well as the theory behind the experiments. He often spent hours analyzing data and questioning experimental procedures. This is evident in his extensive work on the interactions of high-energy photons with hadrons. His work led to important clarifications both of the experimental data and of the theoretical formalism needed to understand the data. It resulted in a major review article, written in 1978 with T. Bauer, R.D. Spital, and F.M. Pipkin.

Don was deeply devoted to his graduate students, many of whom became lifelong friends and colleagues. His teaching conveyed the same meticulous intellectual standards that marked his research, and yet it is his unassuming modesty, his warmth and gentle kindness that are most strongly remembered by his students. Don and his wife, Lois, were a constant source of friendship and hospitality.

Don Yennie will be greatly missed by all who knew him. His influence as a physicist and as a human being will remain with everyone.

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