

Fritz Rohrlich, May 12, 1921----

Fritz Rohrlich was a graduate student in the years 1945-1948 when the work of Tomonaga, Schwinger, and Feynman, devising ways to remove infinities in quantum electrodynamics, became known. Although he was a student of Schwinger's, his dissertation was on neutron-neutron and neutron-proton scattering. This dealt with tensor forces that Schwinger had shown are needed to explain the quadrupole moment of the deuteron. However, as a visitor of the Institute for Advanced Study in Princeton in 1949, Fritz began his work on quantum electrodynamics with the paper *Quantum Electrodynamics of Charged Particles without Spin*. He followed this up during a two year postdoc with Hans Bethe at Cornell with a paper *On the Lamb Shift for Spinless Electrons*. His study of quantum electrodynamics led in 1955 to the joint publication with Josef M. Jauch of **The Theory of Photons and Electrons: The Relativistic Quantum Field Theory of Spin One-half**. In the following years this book was read by all young theorists who wanted to learn quantum electrodynamics. Its popularity was such that in 1976 Fritz was asked to undertake a revision.

The path to recognition was not straight. Fritz Rohrlich was born on May 12, 1921 in Vienna, Austria. His mother Illy (Cecilia) was his father Egon's second wife. Egon was a lawyer whose first marriage in 1913 was dissolved after World War I. His step brother, George, who was seven years older, visited week ends and did more for Fritz's education than did his parents. Although he belonged to a Zionist group in Vienna, George went to the United States for study. He had earned a Law degree and completed the work for a degree in Political Science in Vienna, but when he arrived in the United States, he entered Harvard University and received a PhD in Economics, the field in which he made his career. Fritz went to the same grade school and gymnasium as did George. However, he could not complete his gymnasium studies as in 1938 Nazi Germany took over Austria and study in Vienna became difficult. In 1939, Fritz was able to leave Austria for Palestine where he was enrolled in the Technion (the MIT of Israel). His father paid the tuition for the first year and then made gifts of small laboratory equipment until he and the family were arrested and sent to the Theresienstadt concentration camp and then exterminated.

To support himself, Fritz worked part time as a bookkeeper for a British oil refinery during the academic term and during the summers he worked on a kibbutz. After receiving a degree in Electrical Engineering in 1943, Fritz worked at a radio transmitter station for the British Army in Beit Jalla. Fritz worked at night so that he could do graduate study at the Hebrew University during the day. There he studied atomic spectroscopy with Gulio Racah. This work led later, in 1948, to his first publication on atomic spectroscopy in the Physical Review. However, in 1945, his brother managed to have him admitted to Harvard University for graduate work in physics. As noted earlier, he worked with Julian Schwinger on a scattering problem, finished his work on spectroscopy begun in Israel, and received his PhD in 1948. A paper summarizing his dissertation was published in 1949 and in subsequent years several papers appeared on spectroscopy. The following year, '48-'49, was spent at the Institute for Advanced Study where he began his contributions to quantum electrodynamics. At the Institute, he met Hans Bethe who came to lecture on the Lamb shift which required the unpleasant subtraction of an infinite contribution in order to get a finite result. Bethe invited Fritz to come to Cornell for a two year postdoctoral stay – 1949-51. It was during this period that Fritz became deeply involved in quantum field theory. This resulted in two important papers, one being *Quantum Electrodynamics of Charged Particles without Spin* and *On the Lamb Shift for Spinless Electrons*. In the former he showed the need for a direct action term,  $\phi^4$ , in order to renormalize the interaction. Next, Fritz spent two years at Princeton University as a Lecturer. In this period, his scientific output was limited by a heavy teaching load. However, he was also able to guide Artie Komar's undergraduate thesis on the classical electron. This foreshadowed Fritz's interest in the motion and radiation of the classical electron. Coincidentally,

Artie was a Post Doc with Peter Bergmann at Syracuse and remained as a member of the faculty until 1963 when Fritz arrived.

At Cornell, Fritz met Beulah Friedman who was working toward a PhD in speech pathology – in particular, working on the accents of foreign students. They were married in June, 1951 when Fritz went to Princeton and Beulah went to Queen’s College on Long Island to teach speech communication. In 1953, at the end of his two years at Princeton, Fritz was appointed Associate Professor at the University of Iowa in Iowa City. Beulah joined him in Iowa City and there they had two children, Emily and Paul.

In Iowa, he had a brief, but fruitful, collaboration with Josef Jauch who returned to Switzerland in 1955. It was during this period that the book **The Theory of Photons and Electrons** was written. At Iowa, he began his study of the motion and radiation of the classical charged particles. He was particularly interested in the self-energy problem, the definition of radiation, and the question whether a charged particle in uniform acceleration radiates. There have been numerous publications on these subjects that have resulted in a better understanding of classical electrodynamics, beginning in 1960 with *Classical Radiation from a Uniformly Accelerating Charge* and culminating in 2002 with *Dynamics of a classical quasi-point charge*. The first being a study of the Dirac approach to the classical singularity and the latter identifying work by Landau and Lifshits as a correct solution.

Fritz came to Syracuse University in 1963. Here he continued his research on the classical electron while also making significant contributions in quantum field theory – e.g., two papers on *Functional Differential Calculus of Operators* in the Journal of Mathematical Physics. Together with a student, James Ten Eyck, he showed the equivalence of formulating quantum electrodynamics on a null plane with the usual formulation on a space-like surface. He pulled together what he knew about the classical electron in a book **Classical Charged Particles** and published another on quantum theory for non-scientists: **From Paradox to Reality**. In the 1980’s, his interests turned to philosophy and history. He retired in 1991, but continues to make interesting suggestions and observations which are exposed at professional meetings and in publications.

Fritz is a Fellow of the American Physical Society, Sigma Xi, and Phi Beta Kappa. He was a Fulbright Lecturer in Austria at the University of Graz in 1974 and the University granted him an honorary degree, Doctor of Natural Sciences, in 1996. He visited the Center for the Philosophy of Science at the University of Pittsburgh for a week during several consecutive years in the 1990s.

Beulah also taught at Syracuse University. She rose to full professor and later chair of the Speech Communication Department of the College of Visual and Performing Arts. On the national level, she became president of SIETAR International (the Society for Intercultural Education, Training, and Research) whose headquarters are in Washington, DC. Beulah died of cancer in 1996. In 2000, Fritz married Phyllis Ferro Lavelanet. Phyllis had earned an MS degree in Social Work from SU and had a career as a Social Worker. Her side interests include buying and selling antiques. Together with Beulah and, later, Phyllis, Fritz has been active on the board of Syracuse Friends of Chamber Music (he was chair 1976-1977). During summers, he and Phyllis spend time in the Adirondack Mountains. There, they enjoy hiking as well as participating every August in the annual SU summer program at the SU camp near Blue Mountain Lake.