The Nobel Foundation brings out short biographical sketches of its prize winners. The material reproduced in this Classics section appears on the website of the Foundation (http://www.nobelprize.org/nobel_prizes/physics/laureates/1982/wilson-bio.html). This autobiography was written at the time of the award and first published in the book series *Les Prix Nobel*. It was later edited and republished in *Nobel Lectures, Physics 1981–1990* (World Scientific Publishing Co., Singapore, 1993).

One point about Kenneth Wilson's background is worth making. Many of the great figures of 20th-century science from the United States whom we have covered in *Resonance* came from small town, non-academic backgrounds. Kenneth Wilson is a notable exception. His father, E Bright Wilson, was a student of the great Linus Pauling, a member of the Society of Fellows at Harvard and later a professor at the same university. His name is well known to generations of physicists and chemists via two books – *Introduction to Quantum Mechanics* by Pauling and Wilson, and *Molecular Vibrations* by Wilson, Decius, and Cross.

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# Kenneth G. Wilson – Biographical

*Kenneth G Wilson*

I was born 1936 in Waltham, Massachusetts, the son of E. Bright Wilson Jr. and Emily Buckingham Wilson. My father was on the faculty in the Chemistry Department of Harvard University; my mother had one year of graduate work in physics before her marriage. My grandfather on my mother's side was a professor of mechanical engineering at the Massachusetts Institute of Technology; my other grandfather was a lawyer, and one time Speaker of the Tennessee House of Representatives.

My schooling took place in Wellesley, Woods Hole, Massachusetts (second, third/fourth grades in two years), Shady Hill School in Cambridge, Mass. (from fifth to eighth grade), ninth grade at the Magdalen College School in Oxford, England, and tenth and twelfth grades (skipping the eleventh) at the George School in eastern Pennsylvania. Before

the year in England I had read about mathematics and physics in books supplied by my father and his friends. I learned the basic principle of calculus from *Mathematics and Imagination* by Kasner and Newman, and went on to work through a calculus text, until I got stuck in a chapter on involutes and evolutes. Around this time I decided to become a physicist. Later (before entering college) I remember working on symbolic logic with my father; he also tried, unsuccessfully, to teach me group theory. I found high school dull. In 1952 I entered Harvard. I majored in mathematics, but studied physics (both by intent), participated in the Putnam Mathematics competition, and ran the mile for the track team (and crosscountry as well). I began research, working summers at the Woods Hole Oceanographic Institution, especially for Arnold Arons (then based at Amherst).

My graduate studies were carried out at the California Institute of Technology. I spent two years in the Kellogg Laboratory of nuclear physics, gaining experimental experience while taking theory courses; I then worked on a thesis for Murray Gell-Mann. While at Cal Tech I talked a lot with Jon Mathews, then a junior faculty member; he taught me how to use the Institute's computer; we also went on hikes together. I spent a summer at the General Atomic Company in San Diego working with Marshall Rosenbluth in plasma physics. Another summer Donald Groom (then a fellow graduate student) and I hiked the John Muir Trail in the Sierra Nevada from Yosemite Park to Mt. Whitney. After my third year I went off to Harvard to be a Junior Fellow while Gell-Mann went off to Paris. During the first year of the fellowship I went back to Cal Tech for a few months to finish my thesis. There was relatively little theoretical activity at Harvard at the time; I went often to M.I.T. to use their com puter and eat lunch with the M.I.T. theory group, led by Francis Low.

In 1962 I went to CERN for a calendar year, first on my Junior Fellowship and then as a Ford Foundation fellow. Mostly, I worked but I found time to join Henry Kendall and James Bjorken on a climb of Mt. Blanc. I spent January through August of 1963 touring Europe.

In September of 1963 I came to Cornell as an Assistant Professor. I received tenure as an Associate Professor in 1965, became Full Professor in 1971 and the James A. Weeks Professor in 1974. I came to Cornell in response to an unsolicited offer I received while at CERN; I accepted the offer because Cornell was a good university, was out in the country and was reputed to have a good folk dancing group, folk-dancing being a hobby I had taken up as a graduate student.

I have remained at Cornell ever since, except for leaves and summer visits: I spent the 1969 - 1970 academic year at the Stanford Linear Accelerator Center, the spring of

1972 at the Institute for Advanced Study in Princeton, the fall of 1976 at the California Institute of Technology as a Fairchild Scholar, and the academic year 1979 - 80 at the IBM Zürich Laboratory.

In 1975 I met Alison Brown and in 1982 we were married. She works for Cornell Computer Services. Together with Douglas Von Houweling, then Director of Academic Computing and Geoffrey Chester of the Physics Department we initiated a computing support project based on a Floating Point Systems Array Processor. I helped write the initial Fortran Compiler for the Array Processor. Since that time I have (aside from using the array processor myself) been studying the role of large scale scientific computing in science and technology and the organizational problems connected with scientific computing. At the present time I am trying to win acceptance for a program of support for scientific computing in universities from industry and government.

I have benefitted enormously from the high quality and selfless cooperation of researchers at Cornell, in the elementary particle group and in materials research; for my research in the 1960's I was especially indebted to Michael Fisher and Ben Widom.

One other hobby of mine has been playing the oboe but I have not kept this up after 1969.

The home base for my research has been elementary particle theory, and I have made several contributions to this subject: a short distance expansion for operator products presented in an unpublished preprint in 1964 and a published paper in 1969; a discussion of how the renormalization group might apply to strong interactions, in which I discussed all possibilities except the one (asymptotic freedom) now believed to be correct; the formulation of the gauge theory in 1974 (discovered independently by Polyakov), and the discovery that the strong coupling limit of the lattice theory exhibits quark confinement. I am currently interested in trying to solve Quantum Chromodynamics (the theory of quarks) using a combination of renormalization group ideas and computer simulation.

I am also interested in trying to unlock the potential of the renormalization group approach in other areas of classical and modern physics. I have continued to work on statistical mechanics (specifically, the Monte Carlo Renormalization Group, applied to the three dimensional Ising model) as part of this effort.