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K. Alex Müller thumb picture

K. Alex Müller

The Nobel Prize in Physics 1987

Autobiography

K. Alex Müller I was born in Basle, Switzerland, on 20th April 1927. The first years of my life were spent with my parents in Salzburg, Austria, where my father was studying music. Hereafter, my mother and I moved to Dornach near Basle to the home of my grandparents, and from there to Lugano in the Italian-speaking part of Switzerland. Here, I attended school and thus became fluent in the Italian language.

My mother died when I was eleven years old, and I attended the Evangelical College in Schiers, situated in a mountain valley in eastern Switzerland. I remained there until I obtained my baccalaureate (Mature) seven years later. This means I arrived in Schiers just before the Second World War started, and left just after it terminated. This was indeed quite a unique situation for us youngsters. Here, in a neutral country, we followed the events of the war worldwide, even in discussion groups in the classes. These college years in Schiers were of significance for my career.

The school was liberal in the spirit of the nineteenth century, and intellectually quite demanding. We were also very active in sports, I especially so in alpine skiing. In my spare time, I became quite involved in building radios and was so fascinated that I really wanted to become an electrical engineer. However, in view of my abilities, my chemistry tutor, Dr. Saurer, eventually convinced me to study physics.

At the age of 19, I did my basic military training in the Swiss army. Upon its completion, I enrolled in the famous Physics and Mathematics Department of the Swiss Federal Institute of Technology (ETH) in Zürich. Our freshman group was more than three times the normal size. We were called the "atombomb semester", as just prior to our enrollment nuclear weapons had been used for the first time, and many students had become interested in nuclear physics. The basic course was taught by Paul Scherrer and his vivid demonstrations had a lasting effect on my approach to physics. Other courses were in part not as illuminating, so that, despite good grades, I once seriously considered switching to electrical engineering. However, Dr. W. Kanzig, responsible for the advanced physics practicum, convinced me to continue. In the later semesters, [Wolfgang Pauli](#), whose courses and examinations I took, formed and impressed me. He was truly a wise man with a deep understanding of nature and the human being. I did my diploma work under Prof. G. Busch on the Hall effect of grey tin, now known as a semimetal, and, prompted by his fine lectures, also became acquainted with modern solid-state physics.

After obtaining my diploma, following my interest in applications, I worked for one year in the Department of Industrial Research (AFIF) of the ETH on the Eidophor large-scale display system. Then I returned to Prof. Busch's group as an assistant and started my thesis on paramagnetic resonance (EPR). At one point, Dr. H. Granicher suggested I look into the, at that time, newly synthesized double-oxide SrTiO₃. I found and identified the EPR lines of impurity present in Fe³⁺.

In spring of 1956, just before starting the latter work, Ingeborg Marie Louise Winkler became my wife. She has always had a substantial influence in giving me confidence in all my undertakings, and over the past 30 years has been my mentor and good companion, always showing interest in my work. Our son Eric, now a dentist, was born in the summer of 1957, six months before I submitted my thesis.

After my graduation in 1958, I accepted the offer of the Battelle Memorial Institute in Geneva to join the staff. I soon became the manager of a magnetic resonance group. Some of the more interesting investigations were conducted on layered compounds, especially on radiation damage in graphite and alkalimetal graphites. The general manager in Geneva, Dr. H. Thiemann, had a strong personality, and his ever-repeated words "one should look for the extraordinary" made a lasting impression on me. Our stay in Geneva was most enjoyable for the family, especially for two reasons: the charm of the city and the birth of our daughter Silvia, now a kindergarten teacher.

While in Geneva, I became a Lecturer (with the title of Professor in 1970) at the University of Zürich on the recommendation of Prof. E. Brun, who was forming a strong NMR group. Owing to this lectureship, Prof. A.P. Speiser, on the suggestion of Dr. B. Luthi, offered me a position as a research staff member at the IBM Zürich Research Laboratory, Rüschlikon, in

1963. With the exception of an almost two-year assignment, which Dr. J. Armstrong invited me to spend at IBM's Thomas J. Watson Research Center in Yorktown Heights, N.Y., I have been here ever since. For almost 15 years, research on SrTiO₃ and related perovskite compounds absorbed my interest: this work, performed with Walter Berlinger, concerned the photochromic properties of various doped transition-metal ions and their chemical binding, ferroelectric and soft-mode properties, and later especially critical and multicritical phenomena of structural phase transitions. In parallel, Dr. Heinrich Rohrer was studying such effects in the antiferromagnetic system of GdAlO₃. It was an intense and also, from a personal point of view, happy and satisfying time. While I was on sabbatical leave at the Research Center, he and [Dr. Gerd Binnig](#) started the Scanning Tunneling Microscope (STM) project. Just before leaving for the USA, I had been involved in the hiring of Dr. Binnig. Upon my return to Rüslikon, I closely followed the great progress of the STM project, especially as from 1972 onwards, I was in charge of the physics groups.

The desire to devote more time to my own work prompted me to step down as manager in 1985. This was possible because in 1982 the company had honored me with the status of IBM Fellow. The ensuing work is summarized in Georg Bednorz's part of the Lecture. As he describes there, he joined our Laboratory to pursue his diploma work, on SrTiO₃ of course! Ever since making his acquaintance, I have deeply respected his fundamental insight into materials, his human kindness, his working capacity and his tenacity of purpose!

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Addendum, 1991

Honorary degrees

Doctor of Science, University of Geneva, Switzerland (1987), Faculty of Physics, the Technical University of Munich, Germany (1987), Università degli Studi di Pavia, Italy (1987), University of Leuven, Belgium (1988), Boston University, USA (1988), TelAviv University, Israel (1988), the Technical University of Darmstadt, Germany (1988), University of Nice, France (1989), Universidad Politecnica, Madrid, Spain (1989), University of Bochum, Germany (1990), and Università degli Studi di Roma, Italy (1990)

Honours

Foreign Associate Member, the Academy of Sciences, USA (1989), Special Tsukuba Award (1989), Thirteenth Fritz London Memorial Award (1987), Dannie Heineman Prize (1987), Robert Wichard Pohl Prize (1987), HewlettPackard Europhysics Prize (1988), Marcel-Benoist Prize (1986), Nobel Prize in Physics (1987), APS International Prize for New Materials Research (1988), and the Minnie Rosen Award (1988)

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