Helmut Paul, a happy physicist

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Abstract

Each time I meet Helmut (I address him in an American way, perhaps awfully improperly in Austria), I get a strong impression of a happy man. Why is it so? Well gifted as a physicist and also as a manager, he has had a well-deserved eminently successful career, which warrants his happiness. However, not every physicist of a comparable stature appears to be as happy as Helmut.

As a tribute on the occasion of his retirement, I offer in what follows an analysis of his life, accomplishments, and happiness. The present article is also a dedication to him as the chairman of the 16th International Conference on Atomic Collisions in Solids, which was highly successful, as seen in the Proceedings appearing in the following pages.

1. His early years

Helmut Paul was born on 4 November 1929 in Vienna. The year 1929, about the midpoint between the two World Wars, saw the great panic of stocks and finances. In physics, however, the year was rich in notable events including the quantum field theory of Heisenberg and Pauli, Dirac's electron theory, and Giauque's discovery of oxygen isotopes, all of which led to excellent stages for Helmut's work.

His father, a successful manager in the Siemens Company, and his mother provided a comfortable home and an excellent environment for education. Helmut's qualifications for an academic career were already apparent in his youth; at the age of 12 or 13 in Berlin, where he went to a junior high school, he started tutoring his fellow pupils in mathematics.

He returned to Austria in 1943, and later studied at a high school for science students (called Realgymnasium in German). In 1947 he entered the University of Vienna and studied there till 1950. During this period he was first exposed to nuclear physics, i.e. a subject that he later chose for professional pursuit. For 1950–51, he was at Purdue University on a scholarship. After a short return to Vienna, he resumed his graduate study at Purdue University, and received a Ph.D. there in 1955 for work on the angular correlation of gamma rays resulting from the decay of the ^{181}Ta nucleus.

I cannot help mentioning here my indirect connection with Helmut that originated during his Purdue years. There, he got to know the late Robert L. Platzman, who was then on the faculty there and later became famous for his prediction of the hydrated electron in 1953 and for other great contributions [1,2], and who hired me at Argonne National Laboratory in 1963 (one year after the hydrated electron was discovered experimentally). Helmut enjoyed Platzman's course on thermodynamics, and also worked as a babysitter of the Platzman family. Platzman and his wife, Eva, spoke German, and loved the European culture; therefore, they had much to share with Helmut and must have liked him very much.

For 1955–59 Helmut worked at the Institute for Radium Research and Nuclear Physics in Vienna on nuclear spectroscopy. In addition to beginning a professional career, he found his wife, Elisabeth née Mathis, during this period initiating the enviably happy family we now know. He was also fortunate to obtain a Ford Fellowship for work for 1957–59 at the newly built CERN near Geneva, on a then hot topic of particle physics, viz., the decay of the charged pion into an electron and a neutrino, which is a very weak channel. His contributions to this study and related studies concerned extensive and detailed analysis of data using a computer. This may sound like routine work now; however, it was a highly innovative study at the time. (To provide a point of reference, I was then struggling with computations of atomic wave functions using the first electronic computer built at the University of Tokyo.)

During a visiting professorship at Purdue in 1959–60, Helmut studied beta–gamma angular correlations. In 1960 Helmut got a stable position as the leader of the nuclear spectroscopy group at the Austrian Atomic Energy Laboratory, where he studied beta-ray spectra, neutron decay and other topics. Thus, he established his renown as an experimental nuclear physicist of caliber.

Consequently, it was natural for him to be appointed in 1971 as a full professor of experimental physics at the University of Linz, newly built at that time.

2. His mature years

In Linz he initiated a program for teaching experimental physics as well as a program for research, both from scratch. For there had been no chair of experimental physics there before his; thus, he had to build up every-

thing, from personnel to basic facilities such as machine shops and electronics, and to advanced facilities such as accelerator laboratories.

He acquired a van de Graaff accelerator for 700-keV protons, and wisely decided to use it for research in atomic physics in a broad sense, in collaboration with 0. Benka, D. Semrad, A. Kropf, and others. He himself chose to concentrate on data analysis with computers, leaving experimental and laboratory work to others.

Until about 1975 he continued work on nuclear and particle physics in association with friends at Garching and elsewhere. By then, the Linz program under his direction had begun to produce significant results in the measurements of X-rays emitted after inner-shell ionization of atoms by proton impact. The results provided a basis for chemical analysis with PIXE (proton-induced x-ray emission), a technique now widely used. Work on this general topic continued successfully for many years, and earned international recognition of Helmut and co-workers. They contributed most notably in the critical evaluation and tabulation of cross-section data. Indeed, through this work 1 became aware of the Linz group around 1980.

Another notable accomplishment was the organization of international workshops on inner-shell ionization [3–5], which were effective for informal exchange of ideas and results among workers. The idea of holding a workshop on a specialized topic may sound commonplace now; however, it had to be conceived by pioneers like Helmut, and its realization requires a good sense in management, financial resources, and personal devotion, all of which he managed to provide.

His outstanding ability in management is also evident in his career in the University administration. Starting with service as a senator for 1972-73, he was the dean of natural science and technology for 1973-74, and the president for 1974-77. He also served as the dean again for 1985-87. The second dean appointment, years after the presidency, indicates to me his great popularity as an excellent administrator.

From the early 1980s he took interest in the stopping power of materials for ions; this had been the subject of extensive studies by Semrad and other associates for many years. On this topic again, Helmut initiated a series of international workshops [6,7], which were timely and successful, and made Helmut, and Linz, even more widely known. In this period, a new generation of his co-workers, viz., P. Bauer, R. Golser, and others, were on their way to become prominent in studies on energy losses and related topics.

Through these workshops I became personally acquainted with him. At that time I became in charge of a survey, critical evaluation, and dissemination of stopping-power data for the International Commission on Radiation Units and Measurements (ICRU), a program that continues now. The main business of the ICRU is to produce reports on internationally agreed recommendations on selected topics concerning physical units, standard procedures and instrumentation for measurements of radiation and radioactivity, and basic physical data, all for use in radiological and dosimetric work. During the preparation of the first report on stopping power, chiefly for electrons and positrons [8], I did not know him well enough to ask for his counsel. By the time the second report concerning protons and alpha particles [9] was put together, I was much better acquainted with him; he worked as a reviewer of a draft and contributed generously from his knowledge and wisdom to that report production. He now serves on a committee for drafting a document on stopping powers of materials for heavier particles.

In 1988 the International Atomic Energy Agency (IAEA) began a program for an extensive survey of atomic and molecular data needed in radiotherapy and radiation research, a program of a broad scope, and appointed me as chairman of the program. I immediately asked Helmut for help in a review of current data of the stopping power for various particles. He not only carried out this job excellently, but also contributed materially to the co-ordination of work by about twenty scientists from different disciplines and different countries through incisive discussion and thoughtful advice. The program was successfully completed and resulted in a comprehensive report [10].

3. Epilogue

As the foregoing sketch illustrates, Helmut has been successful in his endeavors, not only because he is richly talented as a physicist and a manager but also he was there at the right place at the right time to do something important in a broad range of topics in particle, nuclear, and atomic physics, as well as in the launching of new institutions or programs. In my view, his success has resulted from his high level of intelligence, from his persistent efforts supported by excellent health, and above all, from his excellent sense of harmony and balance. This last quality is often seen in an Austrian, and reminds me of the great music of Franz Schubert, which is Helmut's favorite, as exemplified in the Trout Quintet and even in the Unfinished Symphony.

I sincerely hope that Helmut enjoys his new phase of life for years to come, and that he continues to make us all feel good each time we meet him by projecting a sense of happiness and delight.

Acknowledgments

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