ZACHARIAS

hyperfine structure, leading (among other things) to precision measurements of the magnetic moments of the proton and the deuteron, was a classic of atomic physics research in which Zacharias played an important part.

In 1940 Zacharias joined the newly established radiation laboratory at MIT, working on airborne radar. It was here that the first 10-cm radar system was developed. Paralleling British practice, young physicists were given leading roles; they proved themselves very valuable in the field of invention, but did not have the kind of background necessary to design devices that could be mass-produced and used in the field. In 1941 the leaders of the laboratory, in particular Lee DuBridge and Rabi, recognized this need and found in Zacharias the person to deal with it. He had a unique blend of talents as both scientist and technologist—Jerome B. Wiesner has called him the first systems engineer. After spending six months with technical personnel at Bell Laboratories (New York City), Zacharias returned to MIT with the onerous task of convincing his colleagues that engineering design and production was a crucially important part of the job. It became evident at this point that Zacharias was a born leader. He knew how to provide encouragement and get others mobilized, but he was also a perfectionist who could be very demanding. He had the great gift of being able to think a project through from A to Z, and yet change course *en route* if need be. The result was that, by 1943, airborne microwave radar was a reality.

In 1945 Zacharias went to Los Alamos to direct the engineering division of the Manhattan Project; his role was much the same as it had been at the radiation laboratory. His direct involvement there was brief, but its consequences were of profound importance to MIT, for in 1946 he returned to MIT, and brought with him half a dozen outstanding physicists from Los Alamos—chief among them Bruno Rossi and Victor Weisskopf. The result was a transformation of the department in both quality and scope. In addition, resuming his prewar interests, Zacharias established his own molecular beam laboratory. Besides yielding much data of nuclear and atomic interest and providing training in the Zacharias style for a new generation of physicists, the research in this laboratory laid the groundwork for the cesium beam atomic clock—perhaps even more remarkable than radar for its translation of fundamental physics into technological reality.

The postwar years saw Zacharias rise to prominence on the national scene, initially in defense policy. Particularly notable was his leadership in 1950 (together with the late Admiral Forrest Sherman) of Project Hartwell, a study of the protection of surface vessels in the face of modern submarines and nuclear weapons. Also of great significance was his leadership of a summer study in 1952 during which the Distant Early Warning Line was conceived. Then, from 1952 to 1964, during the Eisenhower and Kennedy administrations, he served as a member of the President's Science Advisory Committee.

During the mid 1950s, Zacharias turned his abundant energies and organizing abilities toward problems of national education in science. In 1956 he created the Physical Science Study Committee; its chief product, the PSSC high-school physics course, set a new standard for teaching at this level (see the detailed account in PHYSICS TODAY, September 1986, page 30). From there his interests broadened to education at all levels and in many different fields; indeed, he believed deeply and passionately that education was the key to all the social and political problems that beset a democracy.

During the last two decades of his life, Zacharias became more and more concerned with the potential, for good or for disaster, of nuclear energy, but again he felt that proper education of the public was vital; opinion not rooted in hard facts was worthless. Everyone who worked with him became familiar with his catechism: "What, Why, How, Who, For whom, When, Where, How much . . .?" And through it all, as Philip Morrison has said, he was a spokesman for values and standards. He was, in the words of another of his associates, "a force of nature"—a very long-range force, one might add. His many honors included the President's Certificate of Merit (1948), the Oersted Medal of the American Association of Physics Teachers (1961), the National Science Teachers Association Citation for distinguished services to science teaching (1969), the Medal of the International Commission on Physics Education (1984), and the I. I. Rabi Award of the Annual Frequency Control Symposium (US Army and IEEE, 1986).

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Kark Heinz Beckurts

Karl Heinz Beckurts was killed, along with his driver, in a terrorist bomb attack on the morning of 9 July 1986 as he was being driven from his home near Munich to his office at the Siemens AG. A terrorist group known as the Red Army has claimed responsibility for this murder.

Beckurts was born in Reith, Germany, on 16 May 1930. He started a career in physics, graduated from the University of Göttingen in 1953 and received his PhD in 1956. This was the period after World War II in which Germany had regained its sovereignty and was able to begin rebuilding its science and technology with the help of talented young scientists.

In 1956 Beckurts joined the newly founded Nuclear Research Establishment at Karlsruhe where he soon started a group working in experimental neutron physics. I joined his group in 1960 and had the privilege to work with him for about 10 years. Besides his enthusiasm and his inexhaustible reserve of ideas we always admired his intellectual and human qualities. His scientific interests ranged from nuclear physics and cross sections for nuclear reactor needs to applications of neutrons in condensed-matter research. Because he understood the close connection between research and teaching he was active as a teacher, lecturing at the University of Karlsruhe.

During his time at Karlsruhe he wrote numerous scientific papers and a well-recognized book on neutron physics with K. Wirtz. He also contributed in several ways to the realization of the French–German High Flux Reactor at Grenoble, France, now known as the Institut Max von Laue–Paul Langevin and operated by France, Germany and the United Kingdom.

In 1970 Beckurts was appointed chairman of the board of directors of the Jülich Nuclear Research Center. His broader scientific interests and his

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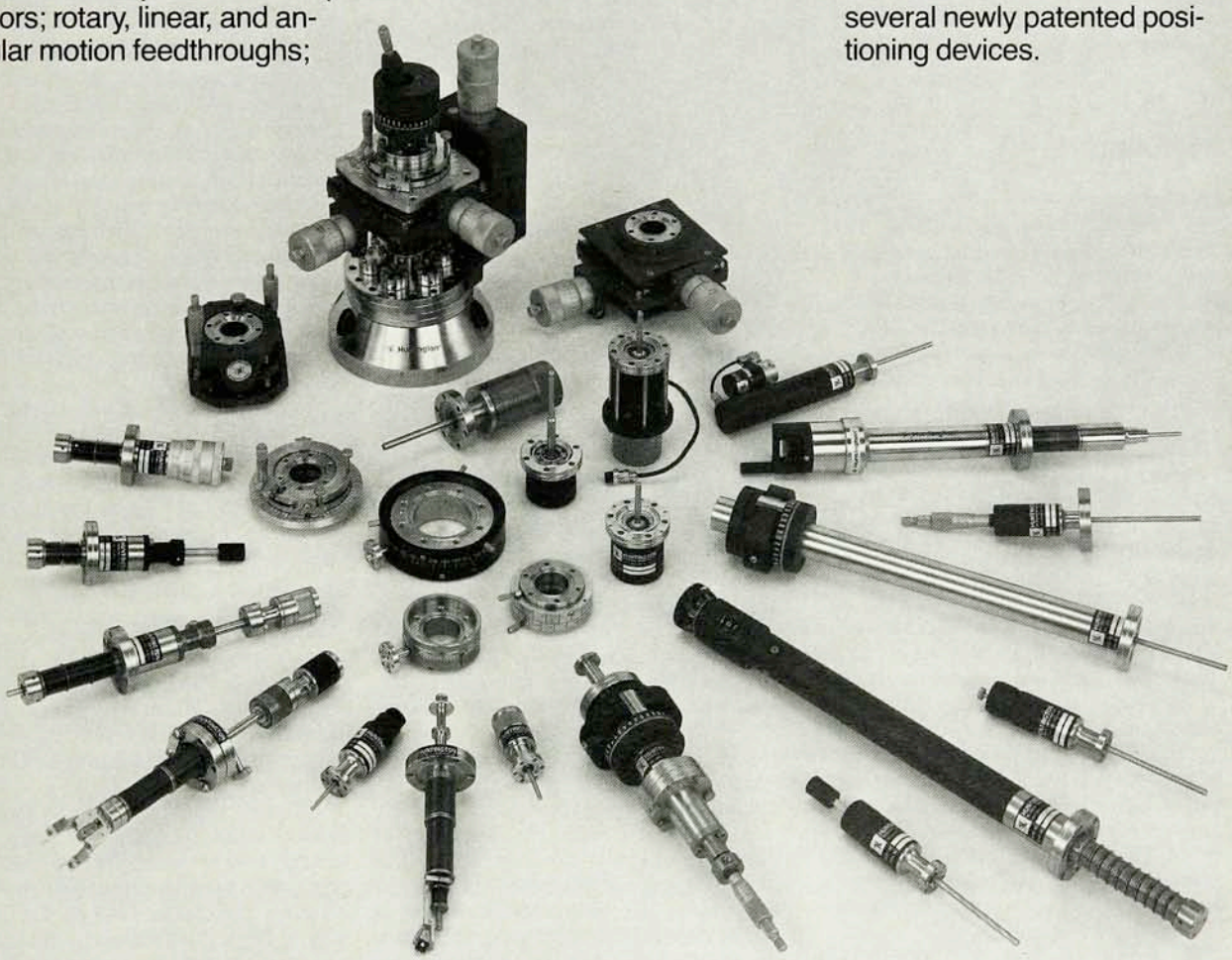

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general belief in the need of a more effective transfer of new technologies toward application encouraged him especially to widen the spectrum of interdisciplinary research activities at Jülich. His guidance led to a remarkable and fruitful development of this center.

It was not surprising, considering his background and achievements, that Beckurts was asked to join the board of directors of Siemens AG. He did so in 1980, and soon assumed responsibility for the company's research and development program. Since 1980 he devoted his efforts mainly to guiding and strengthening research in communication and data-processing technologies at Siemens. In his few years at the company, Siemens increased its efforts in the field considerably.

Beckurts was convinced that the success of research and development programs in advanced technologies crucially depends on the close cooperation of groups at universities and basic research institutions on one side and industry on the other side, and he was very active in encouraging such cooperation. His promotion of the new Walter Schottky Institute at the Technische Universität München was one step in this direction.

During his tenure with Siemens he remained an active participant of various scientific advisory committees. He was also president of the German Nuclear Society from 1973 to 1976. From 1977 to 1979 he was president of the European Nuclear Society.

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Roman U. Sexl

Roman Ulrich Sexl, professor of theoretical physics and didactics of physics at the University of Vienna, died on 10 July 1986 at the age of 46.

Born in Vienna, he studied physics and mathematics at the University of Vienna. After earning his PhD in 1961, he spent several years in the United States. He held a visiting appointment at the Institute for Advanced Study, was assistant professor at the University of Washington, Seattle, and at the University of Maryland, and associate professor at the University of Georgia. In 1969 he became associate and soon afterward full professor of theoretical physics at the University of Vienna.

He began his research in the field of theoretical solid state physics and quantum field theory, but soon became interested in problems of general relativity and cosmology. He wrote a number of papers on the field-theoretic approach to general relativity, in which he discussed the structure of alternative theories of gravitation. In 1967, in collaboration with H. K. Urbantke, he published a pioneering paper, "Cosmic Particle Creation Processes," on the production of particles by the gravitational field. Several years later (1974) Stephen Hawking showed that black holes should produce particles with a thermal distribution, and since that time the problem of particle production in curved spacetime has become a major field of research.

SEXL

Sexl wrote several books on the theory of special and general relativity, including *Gravitation und Kosmologie* (Brockhaus, 1975), and *Relativität, Gruppen, Teilchen* (with Urbantke, Springer, 1974). The book, *White Dwarfs—Black Holes*, written together with his wife Hannelore (Academic, 1979), as a semi-popular introduction to general relativity and astrophysics, was first published in German in 1975, but became a best seller and was translated into several languages. In 1984 Sexl produced a German edition of *Einstein: A Centenary Volume*, first published in English in 1979. From 1974 to 1980 he was a member of the International Commission on General Relativity and Gravitation.

Sexl's interests in pedagogy, always strong, became his dominant interest during the last ten years of his life. He was concerned with the teaching of physics not only for physicists and physics students but also for the general public. He addressed the world of physics by editing (and also contributing to) a series of books on philosophical, epistemological, sociological and historical questions of physics, and we owe to him a new edition of Boltzmann's collected works. He reached the general public through numerous TV shows and popular lectures.

In an effort to improve physics teaching in schools, Sexl not only initiated a reform of teacher education at the University of Vienna, but was also a coauthor of a physics text book for secondary schools that became so successful it was translated into several languages. The need for continued education of teachers was evident to him, and he contributed vigorously to this aim. To make physics more attractive to pupils he introduced problems from such areas as sports or chaotic dynamical systems into his classes. Similarly, he was quick to realize the pedagogical potential of microcomputers; he integrated the use of the micro into his lectures and became the author of a series of computer programs on special relativity.

His contributions to physics education found worldwide recognition. Besides having become a member of the editorial board of several journals devoted to physics teaching, Sexl was a member of the Advisory Board for Physics Education of the European Physical Society. In 1980 he was the first recipient of the R. W. Pohl Prize of the German Physical Society.

In 1978 Sexl was elected a member of the Internation Commission on Physics Education of IUPAP, and from 1981, until his untimely death, he was chairman of that body. With his brilliance, energy and drive, his over-all productivity was quite extraordinary, and although his career was cut tragically short, he made a broad and enduring impact on physics and physics education.

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Heinz Bilz

Heinz Bilz died unexpectedly on 26 June 1986 in Mainz, Germany. He had become severely ill a few days earlier, while giving a colloquium at the local university.

Bilz was born in Berlin in 1926. He was drafted into the German Navy shortly before the end of the war. After a period as a prisoner of war, he began to study physics in 1947 at the University of Frankfurt where he received his *Diplom* in 1954. He continued there as a graduate student under Fritz Hund and obtained his doctorate in 1958 with a thesis on electronic states of refrac-