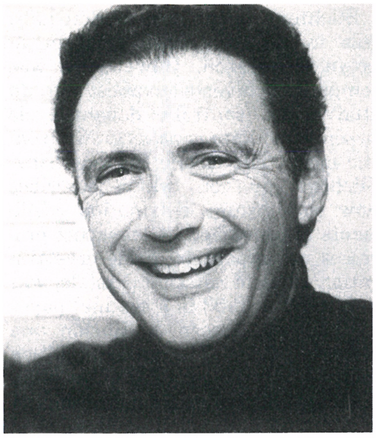
JENS ZORN



Arthur Rich

compared measurements of $g-2$ of the electron at different energies as an experimental verification of special relativity. Also, his group explored microwave-induced transitions between the fine-structure splitting in positronium as tests of the discrete symmetries of *C*, *P* and *T*.

Rich pioneered the generation and use of low-energy, spin-polarized positron beams and the methods used to measure their polarization. In a series of precision polarimetry experiments, he and his coworkers compared the spin polarization of two beta-decaying radioisotopes as a new test of the standard model of weak interactions. In another novel series of experiments, Rich employed helicitized positrons (in which the velocity and spin vectors are aligned) to search for such helicity in the electrons bound in chiral molecules. This property of molecular electrons had never been observed before, and it set limits on any causal role that parity violation in beta decay might play in determining the handedness of chiral molecules.

At the time of his death, Rich was establishing an international collaboration to generate and perform experiments on antihydrogen. He was also working on improvements and applications of the positron microscope, a new microscope that he coinvented with James Van House in 1988.

Rich was also involved in astrophysics in the 1970s. Together with the late Bill Williams, a close friend and colleague, Rich made a series of measurements of the circular polarization of light from white dwarf stars and x-ray sources. A laboratory experiment was even set up to simulate the relevant atomic and plasma physics of a star. During his trips to the telescope at Cerro Tololo, Chile, Rich was deeply troubled by the poverty and despair he saw in South America. These trips played a strong role in his awareness of and outspokenness on issues of social justice.

Arthur Rich maintained the highest standards of scientific integrity in his research, and he applied similar standards of integrity to issues of society and politics. It will now be our challenge at Michigan to maintain these standards in his absence.

David W. Gidley
University of Michigan
Ann Arbor, Michigan

Nathan Sugarman

Nathan Sugarman, a professor emeritus in the Enrico Fermi Institute and the chemistry department of the University of Chicago, died suddenly on 6 September 1990 at the age of 73.

Sugarman was born in Chicago, where he attended public schools and later earned his bachelor's and doctorate degrees in chemistry at the University of Chicago. In 1942, soon after getting his PhD, he was swept up in the war work of the Manhattan Project in Chicago. He headed the group that identified and determined the yields and decay characteristics of many of the fission products of ^{235}U and ^{239}Pu using the first nuclear chain-reaction piles. Sugarman discovered the fission product ^{85}Kr, a radioisotope with a 10.7-year half life that is now assuming importance as an atmospheric tracer on a global scale. He also helped determine the cross-section of ^{135}Xe, a fission product whose poisoning effect on the fission reaction threatened to shut down the first large-scale plutonium-producing reactors at Hanford.

In 1945 Sugarman and a good fraction of his Chicago group went to Los Alamos, where they used their chemical techniques to establish the yield and efficiency of the first nuclear explosion at Alamogordo, New Mexico. This pioneering work by Herbert L. Anderson and Sugarman has evolved into methods for determining the explosive force and other detailed information about hundreds of US nuclear tests. The Alamogordo measurements also laid the groundwork for obtaining similar information about foreign nuclear tests from their debris.

After the war, Sugarman was coeditor, with Charles D. Coryell, of the three-volume scientific report "Plutonium Project Record: Radiochemical Studies: The Fission Products." His experience at the interface of physics and chemistry made him an ideal charter member, in 1946, of the Institute of Nuclear Studies (now the

Enrico Fermi Institute). There Sugarman used chemical techniques to study how 100-MeV to 400-GeV particles interact with heavy nuclei. He concentrated on establishing the momentum characteristics of the products of such reactions as a way of finding out about the mechanisms of their production. For example, he used the differences in kinetic energies and angular distributions of the reaction products to determine whether they were the result of nuclear fission into two fragments of nearly equal mass, or the residues of the emission of many light particles (spallations and evaporation).

Sugarman's high standards and enthusiasm for his research were carried over into an outstanding concurrent teaching career at both the undergraduate and graduate levels.

ANTHONY TURKEVICH
University of Chicago
Chicago, Illinois

William P. Slichter

William P. Slichter, a retired executive director at AT&T Bell Laboratories, died of cancer at his home in Chatham, New Jersey, on 25 October 1990. He had maintained an active interest in his profession to within days of his death at the age of 68.

Slichter was born in Ithaca, New York, but he grew up in Cambridge, Massachusetts. He received his undergraduate education at Harvard University, where his father was the Lamont University Professor of Economics. Upon graduation in 1943 Slichter served in the US Army as an artillery officer in the Pacific Theater. Returning to graduate studies at Harvard in 1946, he studied molecular beams under George B. Kistiakowsky and was awarded his PhD in chemical physics in 1950. Exciting opportunities were then opening up in interdisciplinary areas that were soon to be known as materials science, and Slichter entered upon a career in this field at Bell Telephone Laboratories.

During the ensuing decade Slichter established an enduring reputation through his contributions in both semiconductor physics and polymer physics. His exceptional gifts as a research administrator also became apparent, and he was appointed head of Bell Labs's chemical physics research department in 1958. He advanced to the position of chemical director in 1967 and became the executive director of the materials science and engineering division in 1973. He retired in 1987.

Slichter's initial role at Bell Labs was in an expanding program in polymer research. However, he was temporarily diverted to assist a group studying the control of dopant levels in semiconductor crystals grown from the melt. The classic Burton–Prim–Slichter equation, which describes how equilibrium distribution coefficients are modified by transport processes accompanying finite crystallization rates of rotating crystals, was published in 1953 in a seminal paper by Slichter, Joseph A. Burton and Robert C. Prim. This analysis, which included transient effects resulting from abrupt changes in melt composition, found immediate application in the fabrication of crystals for use in transistors and contributed significantly to the development of solid-state electronics. Slichter played a key role in the experimental work underpinning the model that was chosen for analysis and later in confirming predictions based upon it.

Returning to polymeric materials, Slichter began an extensive investigation of their structure and properties in the solid state. He recognized that the newly available technique of nmr spectroscopy, which could characterize states of molecular motion, afforded an exceptional opportunity to study states of order in semicrystalline polymers. Slichter was the pioneer in exploring the potential of nmr spectroscopy not only for this application but also for studying molecular mechanisms underlying dielectric and molecular relaxation in polymeric materials in general. He did systematic studies of homologous series of polymers of different chemical classes, many of which he himself had synthesized, and he performed parallel investigations by x-ray diffraction. His papers reveal elegant planning and execution of experiments, as well as a characteristic lucidity and incisiveness in interpreting and discussing his observations. During this phase of his career, Slichter was actively involved in the leadership of the division of high-polymer physics of The American Physical Society, and in 1970 he was awarded the society's High-Polymer Physics Prize.

As a research manager, Slichter was quick to recognize that the design and fabrication of advanced communications equipment was becoming increasingly reliant on chemical processing and on new, often polymeric materials. He was instrumental in building interdisciplinary groups of wide-ranging expertise, which were able to respond strongly to the needs of the time. Later as executive director of materials science and engineer-