

Prof. David Arthur Shirley (30.03.1934 – 29.03.2021)

We are sad to announce that our colleague, teacher, mentor, and friend of many years, David A. Shirley, has passed away on March 29th, 2021, following a long illness, just one day before his 87th birthday.

David Shirley played a significant role in the development of the Physics Department (*Fachbereich Physik*) at the still-young *Freie Universität Berlin*, founded in 1948 following the division of occupied Berlin. Beginning around 1967, a number of scientists who were later members of the Department carried out research or were students in Shirley's research group at the University of California, Berkeley. Dave Shirley himself spent two long research visits and numerous shorter stays at the Department. In recognition of his contributions to its personal and scientific development, he was awarded the Department's first honorary doctorate in 1987.



David Shirley was born in North Conway, New Hampshire on March 30th, 1934. Following his high-school graduation there, he studied chemistry at the University of Maine in Augusta and obtained his Bachelor of Science in 1955. He then went to the renowned University of California, Berkeley as a doctoral student, where he received the PhD in 1959 for his work in the research group of William F. Giaque. Giaque was a pioneer of low-temperature physics and chemistry, and was awarded the Nobel prize in Chemistry in 1949 for his development of adiabatic demagnetization. Shirley investigated the thermodynamic and magnetic properties of several inorganic materials in his thesis work. Already in 1958, he became a research scientist at the *UC Radiation Laboratory* (now the *Lawrence Berkeley National Laboratory*, LBNL), where he established the then-new method of low-temperature nuclear orientation and applied it to the investigation of nuclear and solid-state properties of materials and to metrology at low temperatures. Early collaborators on nuclear orientation included Charles E. Johnson and Nicholas J. Stone, both graduates of Oxford University, where Shirley later spent his first Sabbatical. In 1960, he accepted an assistant professor position at UC Berkeley and set up his own research group in the Chemistry Department there, on the boundary between physics and chemistry.

Within a few years, Shirley's group was internationally known and had extended its spectrum of experimental methods for studying hyperfine interactions and the electronic structure of solids, among others with the new method of Mössbauer spectroscopy. Among his early collaborators were Eckart Matthias, Miller Fellow in 1963/65 and later LBL staff scientist, as well as Stig Hagström, postdoc in 1964/65; they contributed to the establishment of perturbed angular correlations (PAC) and photoelectron spectroscopy (XPS) in Shirley's research group. Both had obtained their doctoral degrees at the University of Uppsala, Sweden. In 1967/68, Eckart Matthias spent a sabbatical year in R.L. Mössbauer's group at the Technical University of Munich, received his *Habilitation* degree there, and went in 1969 from LBL to a professorship at the *Fachbereich Physik* of the *Freie Universität Berlin*, as successor to Hans Lassen. This considerably intensified the contacts between scientists at the two institutions. Long-term collaborations with the Shirley group were established, particularly with the research groups of Eckart Matthias and of Günter Kaindl. The latter had completed his doctorate under R.L. Mössbauer at the TUM and was then Miller Fellow 1969/71 and later staff scientist in Shirley's group. Subsequently, he obtained his *Habilitation* at the TUM, and – after two years at the *Ruhr-Universität Bochum* – accepted a professorship in 1976 at the *Fachbereich Physik*

as successor to Stefan Hufner.

David Shirley was promoted in 1964 to Associate Professor and in 1967 to Full Professor at UC Berkeley. In 1966/67, he spent his first Sabbatical year at the Clarendon Laboratory in Oxford with an NSF Fellowship.

During the 1970's, he was chairman of the UC Berkeley Chemistry Department and Dean of the College of Chemistry. In 1972, he was granted the E.O. Lawrence Award, and from 1975, he was director of the LBL Materials and Molecular Research Division. In 1980 he became the fourth Director of the Lawrence Berkeley Laboratory, serving in that post until 1989. Under his leadership, several national research centers were established at LBNL, including the Center for Advanced Materials (CAM), the Center for X-Ray Optics (CXRO), the National Center for Electron Microscopy (NCEM), and the Advanced Light Source (ALS), an electron storage ring of the third generation, optimized as a source for XUV radiation (opened in 1993).

David Shirley was a member of the American Academy of Arts and Sciences and of the National Academy of Science. Soon after his second research visit to the *Fachbereich Physik* (over a period of 13 months in the year of the opening of the Berlin Wall), in the research groups of G. Kaindl and E. Matthias with an *Alexander von Humboldt Research Award*, Shirley accepted a joint position as Senior Vice President for Research and Dean of the Graduate School at the Pennsylvania State University. After his retirement in 1996, he and his wife Barbara lived in Hawaii, in California, and most recently in Tempe, Arizona.

David Shirley's contributions to the development of research using nuclear-physics and synchrotron-radiation-based methods, and especially his leadership in the conception and realization of extremely powerful synchrotron-radiation sources of the 3rd generation, permitting novel research techniques using soft and hard X-rays, were honored in two international symposia, in both of which the *Fachbereich Physik* played a leading organizational role: On the occasion of Shirley's 65th birthday, a one-day symposium took place at LBNL/UC Berkeley on March 29th, 1999, on the topic "Spectroscopy and the Structure of Matter". 15 years later, celebrating his 80th birthday, the *Fachbereich Physik*, in cooperation with the *Magnus-Haus Berlin* and the *Heraeus-Stiftung*, organized another symposium on July 3rd/4th, 2014, entitled "From Classical Physical Chemistry to Accelerator-Based Light Sources", with around 70 participants, including previous doctoral students, guest researchers and colleagues from a number of countries.

Over the years, more than 80 graduate students and around 40 guest researchers worked in Shirley's research group at LBNL, studying hyperfine interactions, photoelectron spectroscopy and applications of synchrotron radiation in physical chemistry and materials science. Shirley granted his students and coworkers a great deal of scientific independence and was tolerant of missteps, contributing to a high level of scientific culture, which was a strong element in the successes of his research group. Meeting him and having discussions with him was always a source of gratification and enrichment.

We will all sadly miss David Arthur Shirley.

William Brewer Günter Kaindl Eckart Matthias