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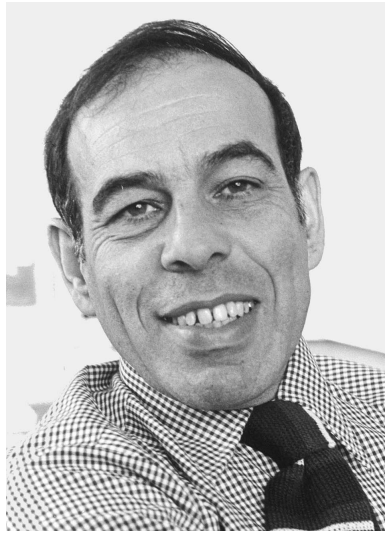
Boris W. Batterman (1930–2010)



Boris W. Batterman, a pioneer of the field of synchrotron radiation research, died on 14 December 2010. Bob (as he was known) was an expert in the dynamical theory of X-ray diffraction and founding director of the Cornell High Energy Synchrotron Source (CHESS), a hard X-ray synchrotron laboratory where numerous seminal developments in synchrotron radiation took place during his 19 years of leadership. Many current leaders in the synchrotron X-ray field, now working at the APS, SSRL, NSLS, DESY and a host of universities, lived and learned under Bob's tenure as CHESS director.

Bob was born on 25 August 1930. He received his PhD degree in physics from MIT under the supervision of Bertram Warren. Batterman was a member of the Technical Staff of the Bell Labs from 1956 to 1965. He moved to Cornell in 1965 as a member of both the Department of Materials Science and Engineering and the School of Applied and Engineering Physics. Bob was awarded both a Guggenheim Fellowship and a Fulbright-Hayes Fellowship from 1971 to 1972. Bob, the Walter S. Carpenter Jr Professor of Engineering, was chair of the School of Applied and Engineering Physics from 1974 to 1978 when he became director of CHESS (co-founded with Neil Ashcroft), a new national NSF-supported laboratory for synchrotron radiation research. In 1983 he received a Humboldt Award.

Throughout his career, Bob made many contributions to diffraction physics, especially in the field of dynamical X-ray diffraction. The early 1960s was an exciting time because perfect single crystals became available and many predictions of the theories of dynamical X-ray diffraction expounded by von Laue and P. P. Ewald could be measured experimentally. Batterman was the first to verify a number of predictions: the thermal narrowing of the Darwin widths, the effect of a Debye–Waller factor in anomalous X-ray transmission and, most importantly, the existence of standing waves in the Bragg diffraction geometry.

In 1969 Bob published a paper where he described how the location of foreign atoms in a perfect crystal could be determined by measuring their fluorescence signal as the crystal rotates through a Bragg peak. This work on X-ray standing waves led to a widely used method for locating impurity atoms in perfect crystals of silicon and germanium, which has now been extended to include mosaic crystals and even surface overlayers, making it

a widely applicable tool. Today, X-ray standing waves facilities exist at almost every synchrotron X-ray source.

Another important contribution to the dynamical theory of X-rays is Bob's famous article of 1964, written in collaboration with Henderson Cole (IBM) and published in *Reviews of Modern Physics*. This review article consolidated material from many sources and languages and was a great help for practitioners of the field. It is still widely read, used and cited despite the fact that it was published almost 50 years ago.

The CHESS laboratory, under Bob's leadership, was not only the home of many important science discoveries but also served as one of the sources for a renaissance in X-ray physics. It paved the way to the Gordon Conference on X-ray Physics, initiated by Roberto Colella (Purdue), a former Batterman postdoc, in 1989. The next meeting was chaired by Batterman, and several of the subsequent leaders, Jerry Hastings (SLAC), Helmut Dosch (DESY) and Ken Finkelstein (CHESS), were disciples of the 'Batterman Group'.

Bob was sought after as an advisor to many projects around the world because of his reputation as an X-ray physicist and his experience in initiating and developing the CHESS facility. His help was particularly valuable when a pilot project using synchrotron radiation using the SPEAR storage ring began at SLAC in 1972. In 1978 Bob joined the materials subpanel of the SSRL Proposal Review Panel. His love for California led him to subsequently move to San Francisco upon retirement in 1997. In the Bay Area he continued his interest in X-rays with Jim Patel (Bell Labs), who had also retired to the Bay Area. Jim and Bob often worked together at the ALS and SSRL synchrotrons.

A tribute session at Cornell on 22 June 2011 honoured Bob's attributes as an inspiring teacher, a savvy CHESS director and a pillar of the synchrotron X-ray community for many years. We will miss him! His legacy includes the many progeny he mentored who have built and now lead laboratories and synchrotron X-ray facilities throughout the world.

Donald H. Bilderback

Cornell University, Ithaca, NY 14853, USA
E-mail: dhb2@cornell.edu

Dennis M. Mills

Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439, USA
E-mail: dmm@aps.anl.gov