
MARY B. HOWARD

Albert Joseph Howard Jr

guidance of W. W. Watson and one of us (Bromley), involved the thermal-column separation of noble-gas isotopes. These he then used in a series of studies of the structure of light nuclei, in experiments carried out at the 3-MV Van de Graaff accelerator at Brookhaven National Laboratory. Thus began a long and productive career in experimental nuclear physics.

In 1962, even before he had completed his doctorate, Al was appointed assistant professor of physics at Trinity. He set up a small laboratory that provided generations of students with substantial early introductions to the art of experimental nuclear physics, particularly gamma and alpha spectroscopy. Concurrently, Al maintained an active and productive research collaboration with one of us (Parker) at the Wright Nuclear Structure Laboratory at Yale and studied nuclear reactions essential to the understanding of stellar nucleosynthesis. Over the years, he also ran experiments with groups at Brookhaven and at Princeton University, sometimes with the participation of Trinity undergraduates.

Al served three terms (1974–78, 1987–90, and 1996–2000, and for the academic year 2001–02) as chairman of Trinity's physics department, served on a full complement of college committees, and carried a full—and often heavy—teaching load. Yet his continual and varied research programs resulted in well over 50 published papers. Trinity recognized Al's distinguished scholarship by naming him Dana Research Professor for 1985–87.

Together with Wayne Strange, the physics laboratory coordinator at Trinity, Al spent much of his last decade refining techniques for accurate determination of environmental radon levels and of radon emanation rates from solids.

We remember Al as an avid golfer, a friend of animals, and a teacher and friend always ready to help colleagues and students. He combined a keen sense of humor with uncompromising dedication to the welfare of his department. He is sorely missed both at Trinity and at Yale.

D. Allan Bromley
Peter Parker
Yale University
New Haven, Connecticut
Harvey S. Picker
Trinity College
Hartford, Connecticut

Elizabeth Ann Johnson

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Elizabeth Ann Johnson, a contributor to several branches of theoretical physics and an advocate for women in science and engineering, died at her home in Guildford, England, on 11 September 2003, after battling breast cancer.

Betty was born in Philadelphia, Pennsylvania, on 18 October 1936. She received a BA in physics and mathematics from Swarthmore College in 1958 and subsequently traveled to the UK as a Fulbright fellow to pursue research in theoretical physics at the University of Manchester. There, she completed her PhD in elementary particle theory in 1961; her thesis was entitled "On Symmetry Classification of the Elementary Particles." Soon afterward, she married; her husband Ron is a professor of theoretical physics at the University of Surrey, UK.

Over the next several years, Betty continued her research in elementary particle theory at Manchester, the University of Pittsburgh, and the University of Wisconsin–Madison. She also held short-term positions at Battersea College of Technology (now the University of Surrey); King's College, London; and the University of Auckland in New Zealand. From 1970, Betty held various part-time positions at Surrey, and her interests shifted to gas dynamics and kinetic theory. During this time, she raised her two sons, one of whom later died in a tragic drowning accident.

In 1986, Daphne Jackson, then the only female professor of physics in the UK and head of the department at Surrey, set up a fund to provide fellowships for women who had taken a break from their careers in science or engineering and wanted to resume those careers. The thrust of the program was to enable such women to join a research group and get themselves up to speed with the latest developments. Betty, one of the first to obtain such a fellowship, joined the condensed matter theory group at Imperial College London in 1986 to work on the theory of delta-doping in semiconductors.

When Jackson died, the program was renamed the "Daphne Jackson Memorial Fellowships Trust." Betty, deeply committed to the ideals of the trust, was appointed its part-time coordinator. She divided her time between the trust and her research at Imperial College, except for a year's leave of absence during the early 1990s to fight cancer. She was also instrumental in setting up Portia, a Web site that provides a gateway for women into science, engineering, and technology, and in creating the Daphnet mailing list for women in those fields. To honor Betty for her services to those returning to scientific and technical careers, Queen Elizabeth appointed Betty an MBE (Member of the Order of the British Empire) in 2002. The University of Bath recognized her commitment by awarding her an honorary doctorate posthumously.

Betty's research evolved into work on inelastic scattering processes in quantum transport and spin-dependent effects in semiconductors. In her theoretical physics research, she was concerned that she not only understand the fundamental physics but predict the effects in real materials. She was frequently asked to repeat calculations for new systems long after she had moved on to different interests. We benefited from her insights based on her broad experience in different research fields and indeed from her expansive network of contacts, a

counterweight to the overspecialization rampant in modern science.

During the late 1990s, Betty championed some unexpected results on spin splittings at semiconductor junctions against the almost universal skepticism of colleagues. It eventually became clear that she had been right and the rest of us had got it wrong. The fruits of this work in the emerging field of spintronics will be a lasting testament to her tenacity.

As a teacher, Betty had a natural affinity for students and understood their difficulties dealing with new and complex concepts. She exhibited great patience and was willing to explain concepts from several different perspectives.

During 2001 and early 2002, although she was undergoing chemotherapy and radiotherapy, Betty continued her research from home through e-mail and occasional visits from colleagues. She was given research facilities and appointed a visiting professor at Surrey. In July 2003, she reported that she again had to undergo chemotherapy and would likely be unable to return to Imperial College any time soon. That was our last contact with her.

Betty was an accomplished pianist, organist, and composer. We remember her with great affection as a scientist with enormous determination who had demonstrated the flexibility to meet the challenges of different areas of research and had reinvented herself several times during her career. Unfailingly courteous and cheerful even in sickness, she served as a splendid inspiration to us. She leaves a gap in all our lives.

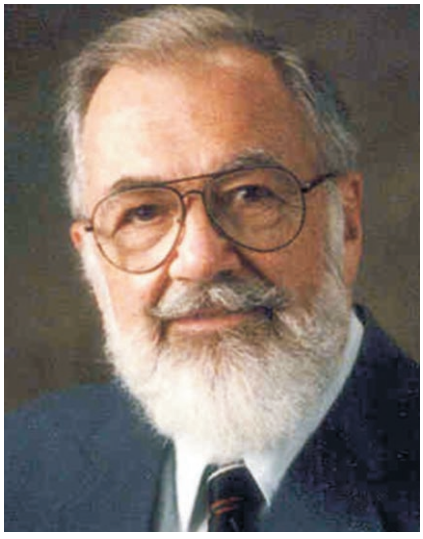
Angus MacKinnon
John Pendry
Imperial College London
London, UK

H. Douglas Keith

For more than four decades, H. Douglas Keith was a leading figure in polymer physics. He died at his home in South Windsor, Connecticut, on 9 February 2003, following a yearlong battle with cancer.

Keith was born in Belfast, Northern Ireland, on 10 March 1927. He received a BSc from Queen's University Belfast in 1948 and a PhD in physics from the University of Bristol in England in 1951.

For the next five years, he taught as a lecturer at Bristol, where he specialized in optics. During that time, Keith was influenced by and collaborated with Peter Paul Ewald, Nevill Mott, and Charles Frank. He emigrated to the US in 1956 after accepting a position at the American Viscose Corp in Marcus Hook, Pennsylvania. There, Keith became interested in the complex structures and morphologies exhibited by macromolecules, a class of condensed matter that was emerging as an important category of materials. Along with Frank J. Padden Jr, he began evaluating the optical properties of spherulites, entities that form during solidification of most crystalline polymers from the melt.



H. Douglas Keith

Keith, along with Padden, joined Bell Telephone Laboratories in Murray Hill, New Jersey, in 1960 and soon thereafter published a highly influential paper on spherulitic crystallization, subsequently known as the Keith and Padden theory. Over the next three decades, Keith interacted with a host of individuals to explain many of the mysteries surrounding the solidification of long-chain molecules.

In the early 1960s, he and Padden provided one of the first morphological descriptions of melt-crystallized isotactic polypropylene, a polymeric material that today is superseded only by polyethylene in commercial importance. Their systematic experimental methods and insightful analyses were applied to many systems, including polyesters, various polypeptides, and other crystallizable polymers. In 1965, Keith and his colleagues discovered intercrystalline links in polymers, which helped explain their mechanical strength. Four years later, he led a group that produced the first chain-folded single crystals of DNA. That work established an important bridge between synthetic and naturally occurring macromolecules.

Keith was instrumental in expanding polymer science and engineering at Bell Laboratories during the 1970s. He headed the analytical chemistry research department and later the organic materials research department, from which a generation of young scientists and engineers began their research careers blending chemistry, physics, and engineering. A superb mentor, Keith combined a sophisticated understanding of physics with a deep appreciation for collaborative and interdisciplinary research. His encouragement and helpfulness to young scientists is legendary, particularly his unparalleled willingness to evaluate and debate new ideas and review manuscripts.

On retiring from what was then called AT&T Bell Laboratories in 1988, Keith moved to the University of Connecticut in Storrs, where he taught and continued his research with polymers until he became professor emeritus in 1996. He remained active in research and his last publication appeared just a couple of weeks before his death. His impact on the field of polymer science and engineering continues to be felt today.

Keith was a leader in the American Physical Society. He chaired the polymer physics division (1965–66) and was a divisional councillor (1977–85). He also headed the committee on applications of physics before it became the forum on industrial and applied physics. In 1973, Keith, with Padden, received APS's Polymer Physics Prize. He was also a fellow of the American Association for the Advancement of Science.

Outside of his profession, Keith maintained many interests. He was an accomplished choral singer and a passionate golfer, and was broadly knowledgeable in history, biography, literature, and music.

Those who knew Keith were impressed by his wisdom, common sense, erudition, and humor. He enriched the lives of many and served as a role model and mentor to a number of younger scientists worldwide who have gone on to make a name for themselves in polymer physics. He was universally recognized as a scholar and gentleman, and those who knew him remember him with great fondness.

Frank S. Bates
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Stephen Z. D. Cheng
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