

impact on the global application of x-ray scattering and absorption to structure determination for crystalline and amorphous states.

In the latter part of his career, Parratt turned his attention to the study of electronic band structure of solids using x-ray spectroscopy. A short paper he wrote in 1958 presciently foretold of the coming uses to which synchrotron radiation would soon be put in studies of condensed matter. He wrote an excellent text, *Probability and Experimental Errors in Science—An Elementary Survey* (Wiley, New York, 1961) on experimental error. And his chapter on x rays in Floyd Richtmyer and Earl Kennard's *Introduction to Modern Physics* (McGraw-Hill, New York, 1947) remains a classic tutorial on the basic physics of x rays.

Parratt was a great educator as well as an outstanding experimental physicist. Parratt had broad interests and abilities that went well beyond physics. He always had the interests of students in mind, and he involved them in department affairs, initiating graduate student participation in a weekly department lunch.

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Walter Marshall

Walter Marshall, who in his early career made many distinguished contributions to the theory of condensed matter and later became a central figure in the British nuclear power industry, died of cancer on 20 February. His years of service to the British government led to knighthood in 1981 and to a life peerage as Lord Marshall of Goring in 1985.

Born in 1932, Marshall was an undergraduate and graduate student at the University of Birmingham under the direction of Rudolf Peierls. He received his PhD at the age of 22 with a thesis on antiferromagnetism. He then accepted a position in the theoretical physics division at Harwell Laboratory where he initially worked on the theory of shock waves in plasmas. But he soon returned to his initial interest in condensed matter physics, bolstered by visits to the University of California, Berkeley, Lawrence Livermore National Laboratory and Harvard University.

He became especially interested in the new applications of neutron scattering to elucidate the properties of solids, liquids and, in particular, magnetic materials. He lectured extensively and lucidly on these subjects,

bringing considerable attention to what was at that time a relatively recondite experimental technique. The lectures culminated in a definitive work, *The Theory of Thermal Neutron Scattering* (Oxford University Press, 1971), which he wrote in collaboration with a former student, Stephen Lovesey. Marshall made important contributions to the theory of magnetism in transition metals, the statistical mechanics of magnetic materials, critical phenomena and molecular orbital bonding in salts. He interacted effectively with experimentalists and became the driving force behind experimental programs that ranged far beyond those of the neutron scattering group at Harwell. He took an early interest in the Mössbauer effect and was instrumental in guiding experimental and theoretical groups into that area as well.

Marshall's leadership qualities were recognized early at Harwell, where he became, at the age of 28, the head of the theoretical physics division in which many prominent theorists worked. Among them were John Bell, Tony Lane, Tony Skyrme, Bill Thompson, John Hubbard, Alan Lidiard, Mick Lomer and Peter Schofield. In this position, he was able to attract a large number of postdocs and visitors, particularly Americans such as Martin Blume, Raymond Orbach, Richard Watson, Robert Howard, Bernard Cooper, Arthur Bienenstock, Brooks Harris and David Adler. He also maintained a good collaboration with the theoretical physicists at the University of Oxford.

Alas for physics, Marshall's organizational strengths were as great as his scientific abilities and by 1968 he had risen to become the director of Harwell. Although he made regular summer visits to Brookhaven National Laboratory to keep his hand in physics, the world of government increasingly commanded his attention. In 1974, he became the chief scientist at the Department of Energy while the Labour party was in power. The Labour Government strongly supported the coal miners, and Marshall's continued advocacy of pressurized-water nuclear-powered reactors led to his leaving this position and returning to Harwell. In 1981, though, after the Conservatives returned to power, Prime Minister Margaret Thatcher named Marshall chairman of the Atomic Energy Authority and a year later made him chairman of the Central Electricity Generating Board. He was soon at the center of the political stage, playing a crucial role in the Thatcher government's defeat of the miners in a long strike in 1984. While at the CEBG, Marshall also began a program of constructing pressurized-water reactors (as opposed



WALTER MARSHALL

to the advanced gas-cooled reactors being built in the UK to that point). He piloted the construction of the first (and only) one, located at Sizewell.

But the benefits of nuclear power and the gratitude of politicians proved ephemeral. The Conservative government was embarked on a program of privatization of the nationalized industries, and the electricity supply industry was high on its list. Marshall argued for a large private organization that would contain the nuclear power stations, but the government eventually decided to withdraw nuclear power from the privatization process and Marshall's role in the industry came to an end. In the remaining years of his life, he played a peripheral role, advising foreign governments and insurance syndicates on nuclear power issues. He founded and initially chaired the World Association of Nuclear Operators, which gave advice on safety to the operators of Soviet-designed reactors in Eastern Europe following the Chernobyl disaster.

To work with Walter Marshall was an unforgettable experience. His intellectual power, tremendous energy and determination to get to the root of any problem made him immensely successful as a scientist. When he applied these talents to the less precise arts of politics, he was not as successful. Some observers saw in him a degree of political innocence; he relied heavily on technical logic to win an argument. Nevertheless, he has left a significant mark on physics and on the history of nuclear power, and he is fondly remembered by many former colleagues.

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