transfer of liquid along the wall and over the rim. This frictionless film flow was an exact analog of the current in a superconductor; it offered a powerful technique for studying superfluidity that was used extensively by Mendelssohn and his coworkers. In particular, the fact that the relation between film velocity and film thickness was governed by the Heisenberg uncertainty principle showed that the film phenomenon was a quantum effect on a macroscopic scale.

In further experiments carried out mainly in the 1950's Mendelssohn and his colleagues showed that the superfluid component of the helium film had zero entropy, which led to what Mendelssohn regarded as his most important experiment in superconductivity: He proved that the Thomson heat in a lead ring carrying a persistent current was zero, from which he concluded that the entropy of the superconducting electrons was also zero.

The development in the 1960's of technologically important high-field superconductors owed much to pioneering work Mendelssohn carried out on superconducting alloys in the 1930's. Then, with his studies of the thermal conductivity of superconductors, he established an effective method for determining lattice imperfections in solids.

He foresaw the growing importance of cryogenics in technology and industry and in 1960 founded the journal *Cryogenics* and in 1966 the biennial Cryogenic Engineering Conferences. He put his gift for lucid and lively exposition to good use in the two monographs *Cryophysics* and *The Quest for Absolute Zero.*

His interests and his knowledge reached far outside his field of specialization. In his book *The World of Walter Nernst* he gave a masterly description of the dramatic rise of German science, technology and industry at the turn of the century, while in *The Riddle of the Pyramids* he put forward novel ideas about the sociological and engineering aspects of the building of those monuments. During the 1960's, having paid several visits to the People's Republic of China, he described his experiences and his views in the book *China Now* richly illustrated with his own photographs.

N. Kurti
University of Oxford

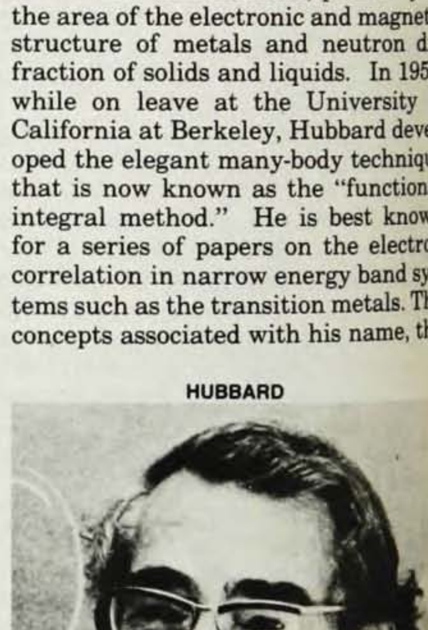
John Hubbard

The physics community lost one of its most brillant and original scientists on 27 November when John Hubbard, 49, died after a brief illness. Hubbard was an internationally renowned physicist, who in a distinguished 25-year research career, made great contributions to the theory of solids.

He received his BSc and his PhD degrees from Imperial College, University of London, in 1955 and 1958, respectively. Hubbard performed the work that was to lead to his degrees in a manner that was to be characteristic: He originated new approaches to outstanding problems and solved them by sound and often elegant mathematical formulations based on fundamental concepts. In his PhD thesis, he developed the "dielectric approach" in the theory of the electron gas in metals. Of Hubbard's initial venture into physics in the mid-fifties, Robert Schrieffer wrote, "His early work on the theory and exchange and correlation in the electron gas remains a classic piece of work."

Hubbard spent most of his career at the Atomic Energy Research Establishment in Harwell, England, as Head of the Solid State Theory Group. Among those he supervised were visiting American postdoctoral fellows who learned Hubbard's exacting standards. At Harwell, Hubbard not only produced the fundamental research for which he is best known, but also made applied contributions on the nature of gaseous plasmas in nuclear fusion reactors and on the efficiency of centrifuges for isotope separation. His basic research included many outstanding theoretical contributions, primarily in the area of the electronic and magnetic structure of metals and neutron diffraction of solids and liquids. In 1959, while on leave at the University of California at Berkeley, Hubbard developed the elegant many-body technique that is now known as the "functional integral method." He is best known for a series of papers on the electron correlation in narrow energy band systems such as the transition metals. The concepts associated with his name, the

HUBBARD



Hubbard Hamiltonian, the Hubbard Model, the Mott–Hubbard transition have become part of the jargon of physics. His work on electron correlation in narrow energy band solids has been described by Walter Kohn as "the basis of much of our present thinking about the electronic structure of large classes of magnetic metals and insulators."

Hubbard made a few other excursions to the United States. He spent summers at Brookhaven National Laboratory in 1963 and 1969, and he was a visiting professor at Brown University in 1970. In 1976, he joined the staff of the IBM Research Laboratory in San Jose. At IBM, Hubbard continued his fundamental work on many-body theory, including work on quasi-one-dimensional conductors. In addition to his basic research, he made applied contributions to the modeling of magnetic recording and provided the theoretical foundations for the experimental activities in phase conjugate optics and neutral-to-ionic phase transitions. In 1978, Hubbard resolved the theoretical problem that occupied him most of his scientific career, namely, the development of a first-principle theory of the magnetism of iron. The reconciliation of the localized and itinerant models of the magnetism of iron into a single model that can yield reasonable values of both the magnetic moment and the Curie temperature has been an outstanding physics problem for over 40 years. Hubbard and others had the correct physical picture as far back as 1960, but it remained until 1978 for Hubbard to provide the mathematical solution to resolve this difficult problem. Subsequent calculations by Hubbard and others have confirmed his solution.

Hubbard enhanced the work of his colleagues enormously, both by his positive suggestions and because of his insistence on carefully examining all assumptions. A patient and helpful collaborator, he will be greatly missed by the physics community, especially by his coworkers.

George Castro
IBM Research Laboratory
Martin Blume
Brookhaven National Laboratory

George L. Jenkins

George L. Jenkins, professor of physics and chairman of the department of Stetson University, died 8 June 1980. He was educated at Berea College (AB 1943), University of North Carolina (MS 1947), and the University of Kentucky (PhD 1947). He was instructor of physics at the University of North Carolina from 1945 to 1948, when he became associate professor at Stetson. ◻