

ANNUAL AWARDS BESTOWED BY FRANKLIN INSTITUTE

The Franklin Institute of Philadelphia awarded four of its 1991 medals to six scientists for physics and physics-related work. The medals were the John Price Wetherill Medal, the Elliott Cresson Medal, the Delmer S. Fahrney Medal and the Edward Longstreth Medal.

Late last fall the Franklin Institute also awarded the first annual Bower Award and Prize for Science to Paul C. Lauterbur of the University of Illinois, Urbana-Champaign. The award is given to a scientist who embodies the practical, entrepreneurial and humanitarian spirit of Benjamin Franklin. It consists of a \$290 000 cash prize and a gold medal.

Lauterbur was cited for "his conception of the possibility of nuclear magnetic resonance imaging, for demonstrating that such imaging could actually be accomplished and for developing many of the techniques and applications" of mri. He began research on nmr spectroscopy in the mid-1950s. In the early 1970s he grew interested in using nmr to reconstruct images of the body, and in 1973 he published a proposal to use this as a

diagnostic method. His proposal involved using a gradient of the magnetic field essentially to convert a variation in frequency into a variation in position. Lauterbur has since developed many mri applications.

Lauterbur received his PhD in chemistry from the University of Pittsburgh in 1962. He then joined the faculty of the State University of New York, Stony Brook. In 1985 he went to the University of Illinois, where he now holds professorships in bioengineering, biophysics, chemistry and medical information science and in the Center for Advanced Study.

Peter John Twin of the University of Liverpool received the John Price Wetherill Medal, which is given for discovery and invention in the physical sciences. Twin was cited for "his discovery of superdeformation in atomic nuclei and for the design of the special apparatus required to achieve that end."

Twin and colleagues at Daresbury Laboratory, England, and the Niels Bohr Institute created superdeformed nuclei by bombarding nuclei in a fixed target with high-energy heavy ions.

The resulting compound nuclei are formed in a very high spin state. By studying the gamma radiation given off by the nuclei, Twin and his colleagues found that the energy spectra of the gammas had very regularly spaced lines, indicating the nuclei behaved as rigid rotors (see page 21).

Twin received his PhD in physics from the University of Liverpool in 1964. He then joined the faculty there, and he is currently a professor of nuclear physics. From 1983 to 1987 he headed the nuclear structure facility at Daresbury Laboratory.

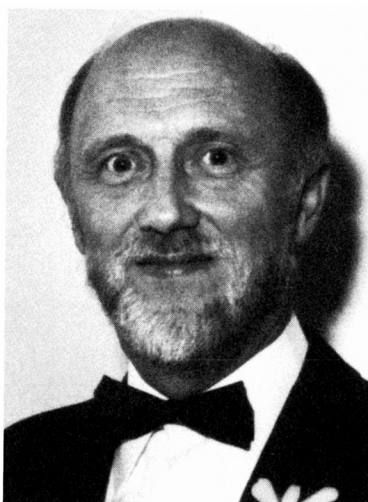
Yakir Aharonov of Tel Aviv University and the University of South Carolina, Columbia, and David Bohm of Birkbeck College at the University of London were jointly awarded the Elliott Cresson Medal. They won the medal for their prediction in 1956 of the quantum mechanical effect that bears their names, the Aharonov-Bohm effect.

Aharonov and Bohm theorized that the wavefunction for a charged particle in a vector potential can experience a phase shift even when the magnetic field itself is zero. For

Paul Lauterbur



Peter J. Twin

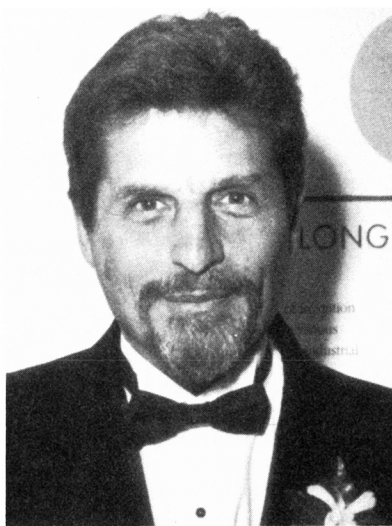


Timothy Coffey





David Bohm



Yakir Aharonov



Slobodan Ćuk



R. D. Middlebrook

example, the effect is shown by a two-slit electron beam diffraction experiment if a solenoid having a diameter much smaller than the distance between the two slits is placed between the slits. With current flowing in the solenoid, the magnetic field is zero outside the solenoid but nonzero inside. However, the nonzero electromagnetic potential outside causes a phase shift in the two beams, resulting in an interference pattern different from the ordinary two-slit one.

Bohm received his PhD in theoretical physics from the University of California, Berkeley, in 1943. He worked at the university's Radiation Lab until 1946, when he became an assistant professor at Princeton University. In the 1950s he worked at the Universidade de São Paulo in Brazil, at the Technion in Haifa, Israel, and at Bristol University in England. In 1961 he became professor of physics

at Birkbeck College, where he is now professor emeritus.

After receiving his PhD in theoretical physics from Bristol University in 1960, Aharonov served on the physics faculty at Yeshiva University. He became a professor of theoretical physics at Tel Aviv University in 1967. Since 1973 he has also been a professor of theoretical physics at the University of South Carolina, Columbia.

The Delmer S. Fahrney Medal for leadership in science and technology was awarded to Timothy Coffey. Coffey was cited for his "research in atmospheric physics and related plasmas and for his distinguished management of the Naval Research Laboratory in Washington, DC," where he is director of research.

Coffey earned his PhD in physics from the University of Michigan in 1967. He headed the plasma dynam-

ics branch of the plasma physics division of NRL from 1971 to 1975, when he was named superintendent of the plasma physics division. In 1980 he was appointed associate director of research for general science and technology at NRL, and in 1982 he assumed his current title.

Coffey has contributed to the theory of nonlinear oscillations, theoretical plasma physics, relativistic electron beam theory and ionospheric and space plasma theory. During Coffey's tenure as NRL's director of research, scientists there have launched six major spacecraft, studied the nature and possible uses of high- T_c superconductors, demonstrated an all-optical towed acoustic array and investigated self-organizing biological systems.

The Edward Longstreth Medal was given to two scientists at Caltech, R. David Middlebrook and Slobodan Ćuk, for "pioneering and expediting the development of integrated magnetics and switched-mode power conversion."

Ćuk and Middlebrook combined the inductors and the transformer, ordinarily separate magnetic components, into a single integrated magnetic structure on a common magnetic core. The new device became known as the Ćuk converter. The input and output filtering inductors in a dc-to-dc switching converter are up to 100 times more efficient than when they are separate components, while component size can be reduced by an order of magnitude.

Middlebrook received his PhD in electrical engineering from Stanford in 1955, and he has been a professor of electrical engineering at Caltech since then. Ćuk was awarded a PhD in electrical engineering from Caltech in 1977, and he is currently an associate professor of electrical engineering there.

AGU RECOGNIZES CONTRIBUTIONS TO GEOPHYSICS

At the May meeting of the American Geophysical Union, Don L. Anderson of Caltech was presented with the 1991 William Bowie Medal, the group's highest honor. Anderson was cited for his studies of the structure and composition of the Earth.

In the 1960s, the citation said, Anderson and his colleagues showed that Love and Rayleigh waves are explained by two velocity discontinuities in the mantle. With his students, Anderson has used surface-wave and body-wave data to confirm these dis-