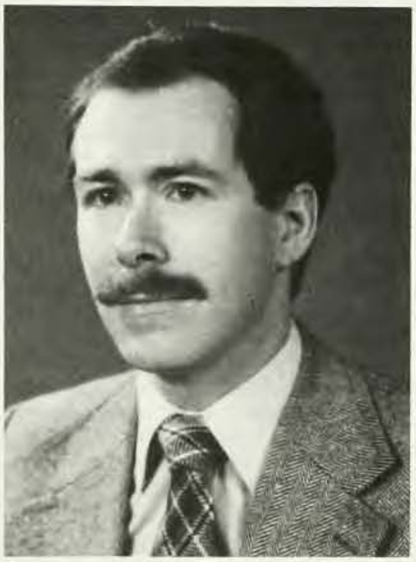
Dyson, t'Hooft and Weisskopf share 1981 Wolf Prize

The 1981 Wolf Prize in Physics will be shared by Freeman Dyson of the Institute for Advanced Study in Princeton, Gerard t'Hooft of the University of Utrecht in the Netherlands, and Victor Weisskopf of the Massachusetts Institute of Technology. The winners are cited for "their outstanding contributions to theoretical physics, especially in the development and application of the quantum theory of fields." The prize, given annually in five areas including physics, will be presented at a ceremony in March 1982 at the Knesset (the Parliament of Israel). The $100 000 honorarium, presented along with a diploma as part of the award, will be divided equally among the winners.

Dyson, professor of physics at the Institute for Advanced Study since 1953, will be noted for his "major contributions to many different areas of physics and technology, in which he made effective use of his deep knowledge of mathematics." After receiving his BA from Cambridge in 1945, Dyson became a research fellow at Trinity College in Cambridge. He was at the University of Birmingham from 1949, until he came to the United States in 1951 to join the faculty at Cornell University.

Dyson's distinguished career began with his proof of the essential equivalence of the formalisms for renormalized quantum electrodynamics of Julian Schwinger, Richard Feynman and Sin-Itiro Tomonaga. His work included developing an elegant mathematical method based on the S-matrix (or the U-matrix of transition probabilities) that has applications to general field theory and to the many-body problem in condensed-matter physics; work with Andrew Lenard (University of Indiana—Bloomington) confirming the stability of matter by demonstrating that the attractive force between electrons and positive nuclei does not cause matter to collapse; and the use of analysis of scattering amplitudes to make fundamental contributions to dispersion theory. In addition, Dyson has added to the public understanding of science through some of his more recent writings, such as his widely hailed book, *Disturbing the Universe*.


T'HOOFT

DYSON


WEISSKOPF


Currently with the University of Utrecht in the Netherlands, t'Hooft is being recognized for making a "major contribution to the revival of quantum field theory as an essential part of our understanding of elementary particles." He received his PhD from the University of Utrecht in 1972. After a two-year fellowship at CERN, t'Hooft went on to become an assistant professor at Utrecht in 1974 and a full professor in 1976. During 1976 he also was Morris Loeb Lecturer at Harvard.

His career includes systematic studies of renormalization and other features of non-abelian gauge theories, and development of the mathematical basis for making calculations in such theories. In particular, he was able to show that one could renormalize theories with spontaneously broken symmetries, such as the electro-weak unified theories. His contributions to mathematical physics have included the use of the minimum subtraction technique, the method of dimensional regularization, systematic calculations of instanton effects, and the calculation of physical quantities in gauge theories for strong interactions by "large N" approximation.

Now professor emeritus in physics and senior lecturer at M.I.T., Weisskopf is cited by the prize committee for "his activity over a period of fifty years" which has extended over "two subfields of theoretical physics: quantum field theory and theoretical nuclear physics. Furthermore, he has gained a reputation as an international statesman and expositor of science."

Weisskopf received his PhD from the University of Göttingen in 1931. He then served as a research associate at the University of Berlin from 1931 to 1932, and as a foundation fellow at the University of Copenhagen and at Cambridge University from 1932 to 1933. He was a research associate at the Swiss Federal Institute of Technology from 1933 to 1936 and at the University of Copenhagen from 1936 to 1937. In 1937 he joined the faculty of the University of Rochester. He became a group leader at Los Alamos in 1943; after the War, he became a professor at M.I.T. in 1945. From 1961 to 1965 he served as director general of CERN.

His contributions to quantum field theory are legion, beginning with his explanation (with Eugene Wigner) of the natural radiative lifetime of atoms. He was among the first to recognize the importance of the self-energy in relativistic field theories and to suggest that renormalization of mass and charge may lead to the removal of the problematic infinities of quantum electrodynamics. In collaboration with Wolfgang Pauli he formulated the correct quantization rules for boson fields. He has made important contributions to the theories of nuclear structure and nuclear-nucleon scattering. The textbook on theoretical nuclear physics that he wrote with John Blatt has become a classic.

Wyld Propulsion Award To John Kincaid

The American Institute of Aeronautics and Astronautics has presented the Wyld Propulsion Award for 1981 to John F. Kincaid of the Applied Physics Laboratory at Johns Hopkins University.

Kincaid, while speaking at the awards ceremony, expressed "alarm" at current thinking about laser weapons, asserting that "laser weapon systems emplaced in space by the great powers would seriously degrade their mutual security." He advocated instead that we strengthen our arms control agreement with hardware. "A far better course than deploying satellite battle stations, is to design missiles which can tolerate attack by spaceborne weapons. We should strive to do this so well that no power is tempted to put weapons in space," Kincaid said.

The Wyld Award is named for James Wyld, inventor of the regenerative rocket motor, which is now the standard motor for rocket propulsion. Given annually by the AIAA, it consists of a medal, a certificate and a citation. Past winners include such distinguished scientists as James Van Allen and William Pickering. Kincaid is honored for "innovative and timely contributions to the solid-propulsion community as an inventor, scientist, and manager, and for continued outstanding technical leadership in the development of propulsion systems for tactical and strategic missiles."

KINCAID

After receiving his master's degree at George Washington University, Kincaid went on to obtain his PhD from Princeton in 1938. His career has gone from conducting research at industrial labs, such as General Electric Co., and Rohm & Haas Co., to working for the government, including the Institute for Defense Analysis and the Department of Commerce, where he served as assistant secretary for science and technology. Since 1971, when he came to Johns Hopkins, he has been the senior scientist at the Applied Physics Lab.

obituaries

Hideki Yukawa

Hideki Yukawa, one of the most original theoretical physicists of the twentieth century and inventor of the meson theory of nuclear forces, died on 8 September 1981 at the age of 74 in Kyoto, where he had lived most of his life. Although in poor health for the past six years, he continued to be editor of *Progress of Theoretical Physics*, the English-language journal that he founded in 1946.

Yukawa's greatest work, for which he was awarded the Nobel Prize in 1949 and which was also his first published scientific paper, was a fundamental field theory proposed to underly both Werner Heisenberg's strong nuclear exchange force and Enrico Fermi's theory of beta decay. One of its predictions was the existence of the meson, to serve as an "intermediate boson" (in modern language) for both strong and weak nuclear forces, which he was the first to clearly distinguish. In the same article, in the *Journal of the Physico-Mathematical Society of Japan* (February 1935), he suggested that the meson should be present in the cosmic rays as a charged particle of mass about 200 times that of the electron. No attention whatever was paid to the work of the unknown Yukawa until 1937, when the "cosmic ray meson" (now called the muon) was found to be the main part of the penetrating component of cosmic rays. This identification, though it was false, brought instant fame to Yukawa and created a surge of interest in meson theory, which was then actively pursued both in Japan, by Yukawa and his collaborators, and in the West.

YUKAWA

Yukawa's meson, the pion, the nuclear force carrier that is the parent of the muon, was found in 1947. Both "mesons" may be regarded as prototypes of new families, lepton and hadron, that became the objects of study of the new field called elementary-particle physics. In that sense, Yukawa became the prophet of a new era in physics.

Appointed professor at Kyoto University in 1939, Yukawa was awarded the Imperial Prize of the Japan Academy (1940) and the Cultural Medal (1943), Japan's highest award. Nevertheless, the international honor of becoming Japan's first Nobel Laureate, at a time when Japanese prestige was low, was a tremendous encouragement to Japan's young scientists and, indeed, to the entire nation. In 1948, Yukawa was a member of the Institute for Advanced Study at Princeton, and from 1949 to 1953 he was professor at Columbia University. To thank Yukawa and to help persuade him to return to Japan, a new institute was established in 1953 at Kyoto, the Research Institute for Fundamental Physics, with Yukawa as its director, a position he held until 1970.

He was born in Tokyo in 1907, the son of Takuji and Koyuki Ogawa. His