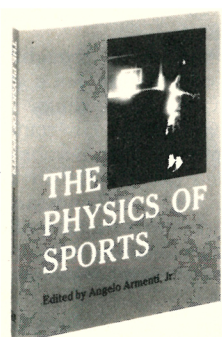


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al Federal agencies involved in oceanography and saw to it that the Navy provided leadership. For the first time the nation's oceanographers were provided with modern ships and other tools. For example Wakelin commissioned Woods Hole Oceanographic Institution's deep submersible, Alvin, which over the years has made stunning biological and geological discoveries in the deep ocean. But perhaps the most significant development of Wakelin's era was that oceanographers learned to pose problems on a truly global scale.

Within the Navy Department, Wakelin did much to consolidate and improve management of the R&D programs that previously were scattered among several departments and many laboratories. Wakelin's management style was ideal for this sensitive task, since it was his habit to approach a problem not as an outside critic but as an understanding friend. As a result he acquired the cooperation of the uniformed Navy and in time became greatly admired and respected by them. He left the Navy Department in July 1984.

Wakelin returned for two more years of government service in 1969 when President Nixon appointed him as assistant secretary of Commerce for science and technology. Once again he provided policy direction to oceanography.

Wakelin was a longtime trustee of the National Geographic Society and a devoted member of its committee on research and exploration.

ROBERT W. MORSE  
*Woods Hole Oceanographic Institution  
Woods Hole, Massachusetts*

## Frederik Jozef Belinfante

Frederik Jozef Belinfante died on 5 June 1991 in Gresham, Oregon. He was 78.

Fred was born in The Hague, The Netherlands, on 6 January 1913. He obtained his professional education at the University of Leiden, working under the direction of Hendrik A. Kramers. After receiving his doctorate in 1939, Fred became a lecturer at Leiden. However, during the German occupation from 1942 to the spring of 1945 the authorities closed the university, and the climate was impossible for original research. In 1946 Fred accepted a position as associate professor of physics at the University of British Columbia. In 1948 he became an associate professor of physics at Purdue University, and in 1951 he was promoted to professor. Fred

became an emeritus professor in 1979, but his retirement from Purdue did not mean a retirement from physics: He continued an active research program in quantum field theory until the time of his death.

Fred was concerned with fundamental questions in all branches of physics, including the foundations of quantum mechanics, quantum electrodynamics, general relativity and statistical physics. He was never content with the standard points of view and enjoyed approaching fundamental questions from first principles.

In guiding his graduate students through their thesis research, Fred always showed an intense personal interest in their progress. Many times he would leave in a student's mailbox in the late afternoon a written question that required several hours of calculations. The next morning he would put the answer in the student's mailbox with a note saying, "Check this with your result." At least some of his students felt this was very good training for the real world of physics.

Fred wrote a definitive, widely referenced book, *A Survey of Hidden-Variable Theory*, on that much debated topic in quantum theory. He maintained a voluminous correspondence on this subject with experts such as Eugene Wigner, John Wheeler, Victor Weisskopf, Peter Bergmann and Abner Shimony.

Fred's impact as a scientist is evidenced in his theoretical work with Wolfgang Pauli on the intensities of molecular spectra and scattering; in his beautiful argument for the reduction of functions in atomic spectra; in his introduction of a single family name for both neutrons and protons; and in the algorithm by which he showed, using only the postulate of special relativity, that symmetrization of the energy-momentum tensor was necessary for obtaining the angular momentum of a field (and hence the spin of a particle).

Fred's interests beyond physics were many, ranging from photography to stamp collecting to linguistics. He was expert in Esperanto, and some of his scientific papers were written in that language. It was a joy to converse with Fred. He was always willing to discuss any scientific question that might arise, and he never had a harsh word for anyone.

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