obituaries

His security clearance was quietly restored, clearing his record once again.

What kind of man was he? Grace Marmor Spruch's profile in *Saturday Review* (1 February 1969) says it well: "The composite Condon is a moral, impassioned man, with a depth of concern for mankind not common in scientists; a man fiercely principled and anti-diplomatic; a man who believes and feels in sharp contrasts, who will let the world know his position without ambiguity. Fuzzimindedness is an anathema to him and he insists on saying so at every opportunity. But this rasping trait is wedded to an extreme generosity and kindness. Throughout his life he has given freely of his time, his counsel, his finances, and his home."

Watergate came as no surprise to Edward Condon, nor did its aftermath. I imagine he would like to have lived to see the outcome of the impeachment inquiry. But Condon understood and paid his share of the price of liberty. Somehow his idealism, his sense of humor and his inexhaustible energy made his relentless quest for a better world look like optimism. He was elected president of the American Association for the Advancement of Science during the height of his troubles with HUAC. He was president of the Society for Social Responsibility in Science (1968-69) and co-chairman of the National Committee for a Sane Nuclear Policy (1970). He was appropriately honored on his retirement from JILA and the University of Colorado in the summer of 1970 by the volume edited by Brittin and Odabasi mentioned earlier. Brittin relates a comment about Condon by E. Bright Wilson: "Sometimes I think he looks for trouble," Wilson said. Condon's comment: "It's not hard to find."

Sadly, brilliant scientists—who serve their country and principles, their love of truth and their fellow citizens with relentless determination and delightful good humor—are hard to find indeed.

LEWIS M. BRANSCOMB
Vice-president and chief scientist
International Business Machines Corp
Armonk, New York

Fritz Zwicky

Fritz Zwicky, emeritus professor of astrophysics at the California Institute of Technology, died on 8 February.

Born in Bulgaria in 1898, Zwicky was a Swiss citizen and received his PhD from the Federal Institute of Technology in Zurich in 1922. Trained in the European tradition of physicists and chemists, he was a student of Paul Scherrer, who in turn had worked with Peter Debye. He was a contemporary of Wolfgang Pauli and friends with Herman Weyl, both when the latter was in Princeton and in Europe.

Zwicky came to Cal Tech in 1925 and was made assistant professor of theoretical physics in 1927. His original field was crystallography, but while in Pasadena his interests expanded into many other fields, such as mechanics and astronomy. From 1943 to 1945 he was research director for the Aerojet Corporation. During these years he worked on and invented rocket and propulsion engines using morphological principles—a lifelong interest that lead to his writing a book on morphology and becoming president of the Morphological Society in 1961. He received the Medal of Freedom for services to the US Government in 1949.

FLOYD CLARK

ZWICKY

Later he became a vice-president of the International Academy of Astronautics.

Zwicky became professor of astrophysics at Cal Tech in 1942, and as Palomar Mountain began to be developed into an observing site he initiated the installation of the fast, wide-field, 18-inch Schmidt telescope. With this telescope he pioneered in the systematic search and discovery of supernovae in external galaxies. Even by the time of his death he had still personally discovered more supernovae than all the rest of supernovae searchers combined. His research papers on supernovae, some done with Walter Baade, led him to his most noteworthy achievement, namely the prediction of the existence of neutron stars. The theory of neutron stars was later mathematically developed by J. Robert Oppenheimer and George M. Volkoff, and recently has been substantiated by the discovery of pulsars.

One of his most formidable undertakings, of enormous use to the whole field of astronomy, was to catalogue all galaxies and clusters of galaxies down to apparent magnitude 15.7 over most of the sky visible from the northern hemisphere. He also catalogued subluminous blue stars and this led naturally, at the time of the discovery of quasars, into the defining and cataloguing of compact galaxies and galaxies morphologically similar to quasars. Always outspoken and colorful, his battles for time on the big telescopes and priority for discoveries led him to coin a number of pungent and memorable epithets.

Always an iconoclast, he chafed some of his colleagues by openly demonstrating less than total belief in the large expansion velocities of distant galaxies, which are so much a part of big-bang cosmology. He always took care to refer to "symbolic" values of recession and "indicative" redshifts. In view of his wide interests and audacious spirit it is a fitting epitaph that at his death he had just finished translating into English from the original German, his book entitled *Every man a Genius*.

HALTON ARP
Hale Observatories
Carnegie Institution of Washington
California Institute of Technology
Pasadena, California

Leon Rosenfeld

With the death of Léon Rosenfeld on 23 March the physics community has suffered the loss of an exceptional personality.

Rosenfeld was born in Charleroi in Belgium on 14 August 1904 and studied at many of the leading theoretical physics centers in Europe. After holding a professorship in Liège, he was called to the chair in Utrecht in 1940 and from there went to Manchester in 1947. In 1958 he moved to Copenhagen as professor at the newly established Nordita (Nordic Institute for Theoretical Physics), which operates in close association with the Niels Bohr Institute. He founded the journal *Nuclear Physics*, which came to play a major role in the field, and he remained its editor to the end of his life.

Rosenfeld was active in many fields of physics. His work includes important contributions to field theory as well as to nuclear physics (analysis of nuclear forces, theory of resonance reactions). He often returned to basic problems of statistical mechanics, and in recent years he was occupied with the problem of irreversibility in large quantal systems.

He was a great scholar in the history of science and his contributions include analyses of the work of individual scientists as well as of the social conditions for the development of science. With his philosophical inclination, he was greatly attracted to the epistemological problems connected with quantal theory. His activity in this area brought him into fruitful collaboration with colleagues in the fields of psychology, philosophy, biology and social sciences. The breadth of his knowledge was legendary and his scientific work of a versatility that is rarely seen in our time.

Rosenfeld visited Copenhagen for the first time around 1930 and soon came into close personal contact with my father. An intimate collaboration developed, which lasted to the end of my father's life, and which was to have great significance for them both. Their approach to problems was very different, but they supplemented each other in a harmonious and effective collaboration. Especially well known is their analysis of complementary relationships in the measurement of electromagnetic fields and currents. My father admired Rosenfeld's clarity of thought as well as his comprehensive knowledge and ability to formulate his thoughts. On many occasions Rosenfeld has expressed what it meant to him to come into such close contact with my father's world of ideas; few, if any, have portrayed my father's personality more vividly or with greater understanding.

Rosenfeld was every ready to fight for his convictions. He enjoyed a good debate and would not refrain from using a sharp pen. Everyone who has studied his writing or listened to him speak will have received a strong impression of his integrity and the richly faceted character of his intellect, the inexhaustible resources of his knowledge and the humor and finesse with

ROSENFELD