UCSD Nobel Laureate Hannes Alfvén dies

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Hannes Alfvén, distinguished professor and winner of the 1970 Nobel Prize in physics, died Sunday night at his home in Sweden. He was 86.

Alfvén is regarded as the father of the modern discipline of classical physics known as magnetohydrodynamics for which he won the Nobel Prize.

The field has a wide range of applications in geophysics, planetary sciences, astrophysics and plasma physics. The implications for the field of plasma physics are particularly important, since plasma--the fourth state of matter along with solids, liquids and gases--is the most common state of matter in the Universe.

Magnetohydrodynamics, the study of magnetized fluids, also is important in astrophysics and is essential for the study of cosmic explosions and the collapse of protostars--magnetic regions of gas from which stars are formed.

Born May 30, 1908 in Norrkoping, Sweden, Alfvén was awarded his Ph.D. at the University of Uppsala. He was named professor of electronics at the Royal Institute of Technology in Stockholm in 1940 and professor of plasma physics at the institute in 1964.

Alfvén served as Senior Lecturer in UCSD's Department of Applied Physics and Information Science from 1967 to 1970, when he became professor-in-residence of the department. Alfvén spent six months of the year at UCSD and the balance of the year at the Royal Institute of Technology in Stockholm.

In 1971, Alfvén was granted the highest honor of the Soviet Academy of Sciences, the Lomonosov Gold Medal, for "outstanding achievement in plasma physics and astrophysics."

Alfvén also was awarded the Franklin Gold Medal by the Franklin Institute in Philadelphia, one year after receiving the Nobel Prize.

In 1985, Alfvén was elected an honorary member of the European Physical Society (EPS), the highest distinction which the society can bestow.

He was described by associates as a "gentle wild man," a phrase supported by his long-time colleague and close friend Gustaf Arrhenius, professor in the marine research division of UCSD's Scripps Institution of Oceanography.

"By 'gentle,' it was meant that he avoided the limelight and did not forcefully push his ideas," said Arrhenius. By 'wild,' it meant that he took no idea for granted; he was a bold thinker who questioned everything."

Friends also say that Alfvén was a wonderful conversationalist, who had a great repository of humorous stories and anecdotes, which he loved to share.

"He also was generous in sharing his knowledge with his younger colleagues," said Asoka Mendis, UCSD professor of electrical and computer engineering who worked with him for about a quarter century.

Alfvén first began to apply magnetohydrodynamics to the study of interplanetary space and solar physics in the 1930s. From this, he derived a highly controversial theory about the origin and evolution of the solar system. In his opinion, the "Big Bang" theory--the widely accepted theory that the universe began some 20 million years ago in a fiery explosion--was highly implausible. However, few scientific journals would publish his critical view of the Big Bang theory.

As an alternative to the Big Bang, Alfvén proposed that hot electrically charged gases known as plasma played a critical, but unappreciated, role in shaping the universe. He claimed that the electric and magnetic forces of plasmas provided the framework and much of the power--in combination with gravity--to organize matter into galaxies and other large structures over a period of hundreds of billions of years.

According to Alfvén's theory, the universe of plasma cosmology has no beginning, and there is no end in sight.

Alfvn also used knowledge about the cosmic plasma in Saturn's rings, obtained from spacecraft missions, to attempt to reconstruct the events that resulted in the formation of the solar system. Alfvén's plasma model of the universe enabled scientists to analyze the structure and composition of Saturn's rings, which he believed represented a "time capsule" containing the evolutionary history of the solar system. Alfvén believed that the study of the rings could be expected to lead to more detailed theories of the formation of planets.

Alfvén also had serious doubts about the safety and usefulness of nuclear energy. At a hearing in 1975 before the California Assembly Committee on Resources, Land Use and Energy, he argued that a large-scale application of nuclear energy would result in the production of enormous quantities of hazardous radioactive materials that could not be adequately contained. He also argued that the peaceful use of nuclear energy was closely tied to the military and that the spread of nuclear energy inevitably would lead to a spread of nuclear weapons.

Ironically, Alfvén had been an early advocate of nuclear power in Sweden, and worked diligently toward its introduction in that country. When he found the Swedish unreceptive to nuclear power, he immigrated to the United States. However, while in this country, his own search of the literature led him to believe that nuclear power was not as harmless as he previously thought; he soon changed his views.

In 1950, Alfvén authored "Cosmical Electrodynamics," considered a classic in the field of physics. His more recent books include "Origin of the Solar System" (1954); "Cosmical Electrodynamics, Fundamental Principles (with C. G. Falthammer, 1963); and "World-Antiworld," (1966).

He published more than 100 papers on plasma physics, magnetohydrodynamics, and astrophysics.

Alfvén is survived by five children, all of whom live in Sweden.

A memorial service will be held April 11 in Sweden.

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