

Dr. Alfven speaks of sailing solar wind to explore system

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Astronauts may one day explore the solar system in spacecraft which will "sail in the solar wind," according to a Nobel laureate at the University of California, San Diego.

In a speech before a meeting of Russian scientists in Moscow (March 2, 1972), Dr. Hannes Alfven, professor of applied physics at UCSD, said alternatives must be developed for present-day chemical propulsion systems if man ever is to explore the outer reaches of the solar system. Chemical propulsion is much too slow, he said.

Alfven was in the Soviet capital to receive the Lomonosov medal from the USSR Academy of Sciences for "outstanding achievements in plasma physics and astrophysics." He won the Nobel prize in physics in 1970.

In principle, solutions to the problems of spacecraft propulsion already are available in plasma physics, Alfven said.

"Cosmic plasmas in our neighborhood contain much energy which perhaps we could extract," he said. "It is known that in the magnetosphere there are voltage differences of the order of several kilovolts and there may be methods to tap this electric energy."

Chemically produced exhaust velocities in spacecraft may reach only "one or a few kilometers per second," Alfven noted, whereas the solar wind - a gas streaming out in all directions from the sun - travels at velocities approximating 300 miles per second. Alfven said scientists might find ways of tapping energy from the solar wind. Thus, in principle, a spacecraft might attain the same velocity as the solar wind, and "sail" in it.

The Nobel laureate said another solution to spacecraft propulsion could lie in nuclear energy. But this is a "difficult and in some respects an unpleasant method," he added.

The "ultimate source" for spacecraft propulsive energy, according to Alfven, is antimatter. (By one definition, antimatter is "matter composed of the counterparts of ordinary matter.") If man learns "how to handle antimatter in a progressive and non-destructive way," Alfven said, "new vistas will open for space travel."

The UCSD physicist envisioned the day when man "will adapt himself to stay in space for very long periods, perhaps even to form small colonies either in space or on the surface of celestial bodies."

"When man feels at home in space," said Alfven, "he will invent new technologies and will look at the universe and at himself with new eyes."

The first decade of space research concentrated principally on the exploration of space near earth, Alfven noted.

"This was found to be not a void and structureless region as earlier supposed, but a region filled with plasmas, intersected by sheaths, and permeated by a complicated pattern of electric currents and electric and magnetic fields."

The second decade of space research, which man now has entered, displays a different character.

"Lunar landings and space probes to Venus and Mars have supplied us with so many new scientific facts that the emphasis in space research has been moving toward intensified exploration of the moon and the planets."

How the solar system was formed and how it evolved will be major problems, if not the main problems, on which space research will concentrate in years immediately ahead, according to Alfvén.

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