

Gas Clouds Speed to Earth

Neutral hydrogen clouds cover large areas of the sky and are being used by astronomers to study the Milky Way galaxy

► **HUGE CLOUDS** of gaseous hydrogen are heading toward earth at speeds up to 500,000 miles an hour, a team of radio astronomers from Ohio State University reported.

The discovery shows for the first time that neutral hydrogen clouds cover a large portion of the sky and are not restricted to certain areas as had previously been thought.

Neutral hydrogen is a complete atom, whereas ionized hydrogen consists of charged atomic fragments. Both types are found separately in large clouds of gas and are being used by astronomers to learn about the structure of the Milky Way galaxy in which the sun and its planetary system, including earth are located.

One theory explaining the neutral hydrogen clouds is that they resulted from super-explosions in the Milky Way galaxy about one million years ago. These explosions are believed to have blown matter toward intergalactic space, and the intruding clouds now detected could consist of this matter falling back into the Milky Way. The clouds are so tenuous, however, that no one on earth would detect them, even if they completely enveloped the solar system.

S. Y. Meng, research assistant at

Ohio State University Radio Observatory, reported discovery of a large number of clouds to the American Astronomical Society meeting in Ithaca, N.Y. The research team making the observations included Dr. John D. Kraus, director of the Observatory, Dr. D. S. Mathewson, visiting professor from Mt. Stromlo Observatory in Australia, and graduate student W. D. Brundage.

Their discovery of neutral hydrogen clouds at high galactic latitudes was made using the Observatory's 260-foot radio telescope, located near Delaware, Ohio. High galactic latitudes refer to a position at a high angle, or "straight up," from the plane of the Milky Way galaxy, which has roughly the shape of a giant bean pod.

The earth is located far from the center of the Milky Way but close to the galactic plane. The billions of stars populating the galaxy are therefore seen most dramatically when looking toward the Milky Way's center, which appears to arch directly overhead in the summer sky.

By looking at right angles to this direction, the Ohio State scientists spotted numerous neutral hydrogen clouds radiating at a wavelength of 21 centimeters.

Radio-Packed Jeeps For Front-Line Talk

► **IF JAMES BOND** went to war, he would surely want one. A jeep filled to overflowing with enough radio gear to make the operator a one-man network is the latest attempt by the U.S. armed forces to overcome their front-line talk-troubles.

Four high-powered radios have been stuffed in the back of the jeep for communications with planes, ground forces and distant headquarters. In addition, two lightweight "manpack" portable units are wedged into remaining crannies. By this time there is scarcely enough room for the driver's toothbrush, let alone the power supply, so the generator for the whole thing is towed behind in a trailer.

The Air Force Systems Command paid for development of the radio-jeep, and now the Tactical Air Command, the Pacific and European Air Forces and parts of the Air Force Communications Service all want some. As a result, General Dynamics Corporation is putting together 377 of them.

The Navy also has plans for a few, so two new types of radios are being produced to take advantage of the centralized, light-weight, mobile system. Even the Army has designed a new radio, which works so well that it has been ordered by the armed forces of Australia, New Zealand and Norway.

One important feature of the communications vehicle is that an electronic genius is not required to operate it.

TECHNOLOGY

Sun Laser Passes Tests

► **THE INTENSE** light of a laser beam powered by the sun, the most desired type for future space communications, has passed its first tests on earth.

Sunlight focused on the side of a tiny crystal rod has successfully operated a laser on earth's surface. The device is already powerful enough to be the basis of a practical communications system in space.

Further development should make the instrument light enough and small enough to weigh only a few pounds and take up only about a cubic foot of space, according to its inventor, Dr. C. Gilbert Young of American Optical Company, Southbridge, Mass.

During the sunny months from June to October last year, the sun-powered laser was operated for several hours at a time. It produced one watt of power in a continuous beam of intense, invisible infrared light.

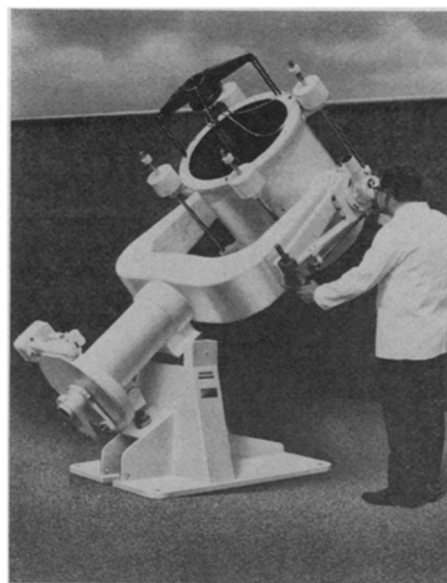
Future developments should result in a laser beam of visible light. Many

scientists believe that the most desirable laser for use in space communications would be one that derives all its power from the sun.

A slender, inch-long rod made of what is called "YAG," or yttrium-aluminum-garnet, showed in the earth-bound tests that it could do the job in space.

The YAG laser is connected to a telescope that tracks the sun across the sky, trapping its light to focus and deliver it to the crystal rod. In this way the sun replaces the conventional lamp and electrical apparatus needed to give other lasers their initial boost.

In addition to carrying messages between spacecraft, the sun-pumped laser could be used as a very intense satellite beacon, Dr. Young reported in *Applied Optics*, 6:993, 1966. His device was developed under the sponsorship of the Avionics Laboratory, Wright Patterson Air Force Base.



American Optical Company

SUN-PUMPED LASER—The sun-tracking telescope used to collect solar energy for a sun-powered, water-cooled laser is shown here. It has been operated successfully by scientists at the American Optical Company.