RADIO

From Milky Way to Earth

Radio signals may have originated in the gas and dust between the stars of the Milky Way, radio survey of the universe reveals.

➤ RADIO signals which have been on their way to us for hundreds and thousands of years may have originated in the clouds of gas and dust that fill much of the spaces between the multitude of stars in the Milky Way, Grote Reber of Wheaton, Ill., told members of the American Astronomical Society meeting in Madison, Wis.

A sheet-metal mirror 31.4 feet in diameter and 20 feet in focal length was the chief apparatus used by Mr. Reber in his radio survey of the universe. This mirror focuses the long-wave radio radiation which it collects from a systematic scanning of the sky. Radio waves originating outside the earth, called "cosmic static," were discovered about 15 years ago by K. G. Jansky of the Bell Telephone Laboratories.

In the radio receiver the cosmic static appears as a hissing sound similar to the boiling of a teakettle. At 160 megacycles the sound is definitely very strong in the direction of the Milky Way. The eccentric position of the sun in the Milky Way galaxy, near the edge in the constellation of Perseus, is confirmed by the weakness of the cosmic static in that direction as compared with its greatest strength in the direction of Sagittarius, toward the center of the Milky Way.

The sun, too, gives off radio radiation, and it is easy to predict how strong it should be at our distance away from the sun. Mr. Reber stated that the observed "static" from the sun agreed well with that theoretically predicted. The other stars in the Milky Way must give off radio radiation too, but their tremendous distances weaken it so much that it is only sufficient to account for an insignificant part of the observed "cosmic static." There must be some other origin for this strong radio energy coming from the direction of the Milky Way, and Mr. Reber proposes that it originates in the depths between the multitude of stars.

Toward the center of the Milky Way, in Sagittarius, clouds of obscuring matter are very prominent, and these same interstellar clouds causes lanes and rifts to be apparent in many other regions of the Milky Way, especially in the directions of Cygnus, Cassiopeia, Canis Major and Puppis, where secondary maxima in cosmic-static intensity have been found by the Wheaton scientist. He proposes that the mechanism for producing these radio impulses is what physicists call free-free transitions of energy.

Free-free transitions result when one particle of matter, most probably an electron which has escaped from an atom, passes another atom and loses some of its energy but is not captured. The electron may pass the nucleus of a hydrogen atom, slow it down a bit or change its direction, and the energy lost will be radiated into space as a pulse of radio energy. These free-free transitions, in the low density of interstellar gas, may be of rather low energy, so the radiation would appear appropriately as long-wave radio energy rather than as the comparatively short waves of light.

The intensity of cosmic static, as measured by Mr. Reber's apparatus, is quite high for the frequencies used by long-distance short-wave commercial stations, somewhat weaker at frequencies used by FM broadcasting and television stations, faint at the lower radar frequencies, and below perception on the best equipment designed for the higher radar frequencies. Therefore, such apparatus as was used to bounce a radar beam off the moon cannot be used to study cosmic static.

It is proposed that a station similar to that at Wheaton be established in a low latitude to enable observations of the portions of the Southern Milky Way invisible at Wheaton—areas in which lie some of the most dense regions of both stars and interstellar clouds. Also, Mr. Reber proposes that conditions in the tail of a comet may resemble, from a radio standpoint, those in an interstellar cloud, so that were a bright comet with a large tail to pass our way an excellent opportunity would be provided to make closehand observations and to verify his theory.

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BACTERIOLOGY

New Antibiotic Source Is Dead Forest Litter

➤ NEWEST source of antibiotics, or penicillin-like substances, is forest litter, the mass of dead and decaying leaves that lie under the trees. Discovery of several antibiotic compounds in litter composed of leaves of maple, birch, beech, ash, poplar, oak and elm is reported by Dr. Elias Melin and Dr. Torsten Wiken of the University of Upsala.

Although apparently formed by mold action, these substances are most effective in checking the growth of molds, especially of soil fungi. One, however, which was extracted from dead maple leaves, proved effective against Staphylococcus aureus, the yellow pus germ of common boils.

Details of the work of the two Swedish botanists are given in the British scientific journal, *Nature* (Aug. 19).

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ASTRONOMY

Gigantic Prism Is En Route to Telescope

➤ A 300-POUND glass telescope prism, the biggest ever made, was completed in Connecticut for installation in the world's largest Schmidt-type telescope at the Observatorio Astrofisico Nacional, in Mexico. It will be used for auxiliary equipment to photograph stellar spectra more than 100,000 times fainter than the faintest star visible to the naked eye.

The prism was ground and polished by the Perkin-Elmer Corp., at Glenbrook, Conn., from a 379-pound optical glass molded at the Bausch and Lomb Optical Company of Rochester, N. Y. The new prism exceeds by three inches the next largest one of its kind. This is in the Schmidt-type telescope at the observatory of the Case School of Applied Science in Cleveland, Ohio.

Without such an objective prism, a star image is but a dot. With the prism, each dot becomes a thread-like spectrum. This spectrum may be observed through a view telescope, or recorded on a photographic plate for future study. From the spectrum lines, scientists are able to ascertain the elements in the atmosphere of a star, its degree of ionization and its surface temperature.

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