

RADIO ASTRONOMY

"Maser" Aids Astronomers

A ten-carat synthetic ruby made to oscillate at microwave frequencies may be able to increase the sensitivity of radio telescopes one hundred-fold.

► A DEVICE that will increase by 100 times the listening sensitivity of radio telescopes is now being installed on the Naval Research Laboratory's 50-foot antenna located in Washington, D. C.

Radio telescopes provide a means of studying the sun, planets and far-away galaxies by tuning in on the radio waves broadcast by these heavenly objects.

The device, known as a "maser," is a ten-carat synthetic ruby that is made to oscillate at microwave frequencies. If the instrument works successfully, it will be the first known time a maser has been used on a radio telescope.

Maser devices developed so far operate only at very low temperatures, about 455 degrees below zero Fahrenheit. The principle on which they work was first demonstrated for beams of molecules in gases in 1954 by Dr. C. H. Townes and his co-workers at Columbia University.

They coined the word "maser," which stands for "microwave amplification by stimulated emission of radiation." Dr. Townes is working with Naval Research Laboratory scientists on applying the maser to a radio telescope.

One of the first objects the NRL's radio telescope will be trained on is Saturn. As yet, no radio waves have been detected from this ringed planet. But C. H. Mayer

told SCIENCE SERVICE that NRL scientists expected "no difficulty" in picking up Saturn's radio broadcasts at a wavelength of three centimeters, or slightly more than one inch.

Radio waves have previously been detected from Mars, Venus and Jupiter at this same wavelength by the NRL team, which includes Mr. Mayer, T. P. McCullough and R. M. Sloanaker.

The NRL scientists will also try to record the radio waves from Mercury, but believe they have less chance of hearing that planet's broadcasts.

One outstanding characteristic of masers is their very low "noise" level compared to conventional microwave equipment. Because the radio waves broadcast by most heavenly objects are so very weak, the noise level of the equipment severely limits the radio sources that can be detected. By reducing this noise level by a factor of ten, maser-equipped radio telescopes can scan a volume of space 30 times larger than possible with conventionally equipped antennas.

Scientists at Harvard College Observatory are also working on a maser device to attach to their radio telescope, and have operated it successfully in the laboratory at a wavelength of 21 centimeters.

Science News Letter, April 12, 1958



ANCIENT AND NEW WRITINGS—Father Roberto Busa, foreground, and Paul Tasman of IBM World Trade Corporation, examine a scroll.

● RADIO

Saturday, April 19, 1958, 1:30-1:45 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Mr. Mike Gorman, executive director, National Committee Against Mental Illness, Washington, D.C., will discuss "The Fight Against Mental Illness."

ARCHAEOLOGY

"Togetherness" Old; Was in Dead Sea Scrolls

► THE WORD "togetherness" for which there is such a modern flair these days was in use back at the beginning of the Christian era by an ancient Hebrew religious order, the Essenes.

This is shown in a comprehensive index to the non-Biblical part of the famous Dead Sea Scrolls. The index, which was made by electronic computer, contains some 29,245 entries. It is more than an aid to scholars in locating particular references in the ancient parchment documents; it is also a great help to them in interpreting the documents and understanding the ancient people who wrote them.

The old Hebrew word "Yakum," which means togetherness, appears only once in all of the Bible. It appears several times, however, in ancient Rabbinical writings and several times also in the account of the Essenes by the first century historian, Josephus. Now the index reveals that the word occurred many times in the Dead Sea Scrolls.

The Dead Sea Scrolls were found by a Bedouin shepherd boy in a cave near the northern end of the Dead Sea where they had been hidden for safe keeping by monks of a Jewish religious order, the Essenes. One of the scrolls, included in the new computer-made index, is the "Manual of Discipline" of that order.

The scrolls now indexed were written over a period of 600 years. They are in three languages, Aramaic, Nabataean and Old Hebrew. The index which might have taken scholars many painstaking years of work to complete was done by the International Business Machines Corporation electronic brain in about three hours of running time. It is now contained on two reels of magnetic tape.

One of the ways in which the index can aid scholars is in providing new understanding of ancient words. When a scholar is trying to interpret the meaning of a word, he can use the index to see in what context the word was used each time it appeared in the manuscript and thus can modify his idea of its meaning to the ancient writers.

The new aid to scholars was demonstrated by Dr. James Muilenburg of the Union Theological Seminary, New York, authority on the Dead Sea Scrolls, and Father Roberto Busa, Italian scholar who is connected with the first literary data processing center at Aloisianum, Gallarate, Italy.

Science News Letter, April 12, 1958