

Local Scientists Enlightened

Studies Atop Haleakala Reveal Celestial Secrets

By E. H. BRYAN, JR.

Grote Reber, pioneer and expert in the field of radio astronomy enlightened a large group, made up of radio engineers, geophysicists, and amateur astronomers, last evening at the Hawaiian Electric Co. auditorium on Ward St.

He explained the way in which he is making observations on radio waves from his observatory on the summit of Haleakala, Maui.

Mr. Reber addressed a meeting of the Hawaii Branch of the Institute of Radio Engineers, with G. W. Clark presiding. Members of the Geophysical Society of Hawaii and Hawaiian Astronomical Society were guests.

Mr. Reber uses the great expanse of sea around the mountain as the "Lloyd's mirror" of a gigantic interferometer. He gets one set of radio waves directly from the source in outer space and simultaneous waves from it reflected from the sea. By measuring the interference between these two sets of radio waves, he can locate the source in space and learn of its character.

FOR EXAMPLE, he has studied the interference pattern of waves which appear to come from the Crab Nebula in the constellation of Cassiopeia. He believes that these celestial radio waves are produced by filaments of expanding gas. No heat is involved in this gigantic dynamo in the sky.

Tracing back the history of this exact spot in the heavens suggests that it was a huge "nova" or new star, some sort of celestial catastrophe, which could have been observed in 1054 A.D. The rate of expansion of the filaments of gas suggests that they came from a common center about 900 years ago, confirming this idea.

ANOTHER SUCH "celestial dynamo" has been found in Cassiopeia, and the arm chair theorists were quick to guess that it might be associated with the famous nova discovered by Tycho Brahe in 1572.

Mr. Reber made a study of its interference pattern and decided that it came from a source too large in diameter to have been this nova. The dynamic source must be a mass of gas of much

larger size, at least 5 minutes of arc in diameter.

But associated with the larger curve in the interference pattern he made out a little wiggle, the wave from a much smaller powerhouse, about one minute of arc in diameter, and its position really corresponded to that of the nova which astounded the astronomers of 1572.

ANOTHER GREAT source of radio waves in the constellation of Cygnus the swan, has been studied extensively by British experts on radio astronomy. The waves seem to come from a spot in the heavens which, when photographed through the great Hale telescope, appears as a fuzzy elongate object.

The interference pattern observed by Mr. Reber, when the source is rising in the northeast, differs from the pattern which comes from it when setting in the northwest. This leads to the belief that the waves come from two great galaxies of stars passing through each other.

THE STARS are so far apart that they do not collide, but the gases in the two systems intermix and produce the power from which come the radio waves. The galaxies are so far away that, although comparable in size with the galaxy of which the solar system is an insignificant part, the width of the two amounts to only about two minutes of arc.

The antennae which Mr. Reber uses to catch these radio waves are mounted on a large wooden structure resting on a turntable made of 12 inch pipes resting on wheels on a circular track 50 feet in diameter. The observatory is at an elevation of 10,000 feet above the sea, with the horizon 140 miles away.

EVEN WITH this huge apparatus and using wave lengths of 20, 50 and now 100 megacycles, with hopes of using 200 and 300 megacycles in the future, Mr. Reber finds that many of the waves are difficult to catch. Turbulences in the ionosphere cover up or mask many of them.

The best observations are made at night, when this interference is reduced (in the absence of ultraviolet rays from the sun); but using 100 megacycles, he is able to get some radio waves in the daytime.