OF PUBLICATION

Hearing the Radio of the Stars

WJZ and Blue Network, 8:30 p.m. Monday, May 15.

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P. B. FINDLEY

Thank you, Mr. Announcer.

You have taken part in some long-distance broadcast pick-ups -- from across the continent, from Europe and from Australia. But tonight we plan to have a broadcast pick-up from further off than any of those, a pick-up that will break all records for long-distance!

We shall let the radio audience hear radio impulses picked up from somewhere outside the solar system, from somewhere among the stars. We are very sure that the impulses or radio "hiss" you will hear comes in part from outside the solar system and from a point among the stars, because it reaches the earth from a definite direction in space which is constantly moving with the starry background of the heavens themselves.

These radio impulses from the stars were discovered by Karl G. Jansky of the Bell Telephone Laboratories while he was studying the faint static hiss that can be heard on a sensitive radio set when its amplification is turned up so as to get the faintest possible signal. At Holmdel, N.J. where the Bell Laboratories have a 400-acre tract in the woods, Mr. Jansky has a tremendously sensitive receiving set, with a long antenna system mounted on wheels so it can be turned in any direction.

Using this elaborate, sensitive equipment to listen to the faint static hiss that is always present in such a sensitive receiver even on the best days or nights, Mr. Jansky noticed that the hiss was

directional maximum was continually rotating around the horizon, approximately once every day.

At first he thought naturally that this maximum of his had something to do with the sun's position and with the earth's daily rotation. But when he began to keep accurate records of the shifting of position of this stronger hiss, which is recorded by automatic measuring instruments, Mr. Jansky noticed that each day its position was just a <u>little bit ahead</u> of the position at the same hour the day before. That is, in a week there would be a difference of half an hour in the position of maximum hiss. In a month a difference of two hours. So apparently this strongest hiss was not following the sun's position at all, but was following something which gained on the sun about 4 minutes a day, or two hours a month, or a whole rotation of the heavens in a year. Mr. Jansky said nothing in public but continued to keep his records carefully over a whole year, and at the end of that time, the maximum hiss was back again, once more coming from exactly the same direction as it did on the same date 12 months before.

Now if you are accustomed to watching the stars in the evening sky, you have noticed that each night any given star or group of stars will rise 4 minutes earlier than it did the night before, and that in a month such groups of stars are all appearing two hours earlier. If you will stop to think you will see that this continual shifting of the stars must occur, because while the earth turns over 365 times a year, with respect to the sun, its revolution around the sun makes it turn an additional rotation with respect to the background of the stars. So that really the earth revolves 366 times with respect to the universe

day earlier, or 4 minutes earlier than the day before.

Evidently then, the radio waves or hiss Mr. Jansky was picking up was coming from some definite spot in the sky of stars, entirely independent of the sun's changing position among the stars. The instruments were detecting a stream of radio coming from some fixed point in the universe of stars, outside of the earth, the sun or the solar system -- radio impulses from the stars themselves.

In a moment, I want you to hear for yourself this radio hiss from the depths of the universe. We are going to let you listen in on Mr. Jansky's sensitive radio receiver there at Holmdel, N. J. and you will hear the noise of static. Part of this static you will hear is due to atmospheric causes right here on earth, like any static. But another part of what you will hear is that extra static which comes from the depths of space itself and is continuously changing in position around the horizon, as is detected and evidenced by thousands of records kept at the receiving station.

Now, through the courtesy of the Long Lines department of the American Telephone and Telegraph Company, I will let you listen on the sensitive receiving set at Holmdel, 50 miles southwest of New York City. Mixed in with the static you will now hear, will be the hiss of radio from the stars.

HISS (10 seconds)

Please understand that a large part of this sound you just heard is due to earthly static, but mixed with it, is the slight but regularly changing static hiss which Mr. Jansky discovered as coming from a definite point in the sky of stars. Let's hear this radio hum from the depths of the universe once again.

HISS (10 seconds)

ask him to tell us from what part of the astronomical heavens his calculations show that this maximum radio impulse is coming.

MR. JANSKY - The observations show definitely that the maximum of his comes from somewhere on the celestial meridian designated by astronomers as "18 hours right ascension." We are sure of this to within an error of a few degrees.

CALDWELL - That is tremendously interesting to astronomers, Mr. Jansky, because it is near the 18 hour meridian that astronomers locate the point toward which the sun and all the planets of the solar system are rushing, at a speed of hundreds of miles per second. We are all evidently headed for somewhere near the same place in space from which your radio waves come.

JANSKY - Yes, that's the way it looks, Mr. Caldwell. But my measurements further show that the radio hiss comes from a point on that 18-hour meridian somewhat south of the equator, that is at about minus ten degrees in declination, as the astronomers would define it. From the sky chart hiss, that point would fall in the Milky Way in the constellation of Sagittarius.

CALDWELL - Mr Mr Jansky, that's almost exactly the point in the Milky Way which Dr. Harlow Shapley of Harvard University Observatory, and the leading American astronomers, have defined as the center of the Milky Way Galaxy, that aggregation of several billions of stars, among which our sun is one little minor star.

calculations that the radio waves seem to come from the center of gravity of our galaxy. For you can realize that if all the stars in one galaxy were sending out radio waves such as we detect, with the instruments at Holmdel, then they might naturally appear to come from the center of gravity of the system.

CALDWELL - Mr. Jansky, have these radio waves from interstellar space a definite wavelength or frequency?

JANSKY - No, they seem to be of all wavelengths. It happens that my observations have been made on a wavelength of 14.6 meters or 20,700 kilocycles. But I feel sure these interstellar static impulses will be found all up and down the radio spectrum, probably increasing with frequency in the high-frequency portions.

Perhaps the radio audience would like to tune in on Sagittarius again. Here we are.

HISS (10 seconds).

Thank you, Mr. Jansky, this has been a most interesting demonstration. There is only one additional speculation, I would like to throw before you. If that radio hiss comes from some source at the center of the galaxy -- a galaxy which astronomers tell us is at least 30,000 light years from the present position of the earth and solar system, then the power necessary to transmit to earth even such a radio hiss as the stellar part of that hiss we have just heard, would have to be pretty prodigious. It would take a radio station many millions of millions of millions of times as powerful as any we have on earth today.

a pick-up from a most sensitive antenna. This will illustrate to you, I think, how important is your own antenna of your home receiving set. It is your antenna which picks up the faint impulse without which even the best radio receiving set is useless.

After a hard winter, with injury from ice, sleet and strong winds, your antenna may need to be put into first class condition, if you are to get the full benefit of the wonderful programs on the air.

Your antenna for broadcast reception should be high, well-insulated, and clear of other wires and metal structures. If you suffer from electrical interference a shielded lead-in may be of help in reducing man-made static, although it will be of little aid in eliminating natural static.

But get your antenna put into good condition, and you will find that broadcasts come in more clearly and free of much interference.

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