

January 27, 1940
212 W. Seminary Ave.
Wheaton, Illinois

Dear Keenan:

It seems that the farther the field is probed the better the hunting becomes.

Apparently Henyey's calculations on encounters between electrons is considerably different than that of Eddington's in 1934. The general conclusion then was that long wave radiation due to such interaction would be much less than between electrons and ions. How about between ions and ions?

I assume you have been using Jansky's stated maximum value of .39 microvolt/meter/(kc.bd)^{1/2} at 14 meters. How he got this number I have never been able to find out. Reference directly to his data of fig. 14 page 1931, Dec. 1933 Proc. IRE and to subsequent papers shows a maximum of only .078 microvolt/meter/(kc.bd). To first approximation the acceptance cone of his original antenna may be taken as an ellipse 37° altitude and 30° azimuth pointed 45° above the horizon. This gives an intensity from galactic center of 1.4×10^{-17} ergs/sec/cm²/cir.deg/kc.bd. at 14 meters.

Furthermore in his Dec. 1937 Proc. IRE paper he gives data from the region of Cygnus using a rhombic antenna having an effective acceptance cone of approximately 110 circular degrees. With this setup the maximum field strength from cosmic static is about .01 microvolt/meter/(kc.bd)² or 2.4×10^{-18} ergs/sec/cm²/cir.deg./kc.bd at 18.7 meters.

The data of Friis & Feldman, while not easily reducible

point to a value similar to the above from the same direction. These two values do not check very close but at least are within the same order. My opinion is that .39 microvolt/meter/(kc.bd.)^{1/2} is simply an error of statement.

Between jumps during my work at Armour I have had time to think the whole business over. At first it seemed best to patch up the existing electrical apparatus but close inspection revealed so many things lacking that I finally decided to start from scratch. The main fault with present apparatus is the number of quanta captured during the period of integration is so small that fluctuations are apparent on the meter. This set an upper limit to the possible sensitivity. Without lengthening the period of integration the only out was to increase the band width. Practically nothing useful was known on wide band amplifiers for use at these high frequencies; consequently I have had to spend considerable time working up a design. This is now in process of making detail drawings. Band width will be from 10 to 12 megacycles compared to one megacycle for present apparatus. The sensitivity will be correspondingly increased and by the use of a converter ahead of this amplifier its full sensitivity could be available at 720 megacycles.

I have investigated recorders available on market and intend to purchase an Esterline Angus and a General Radio D.C. amplifier as companion. Continuous readings should then be available during quiet hours of night.

When the above equipment is in operating condition the data should begin to roll in. A fool proof demonstration

can then probably be given and I will be in a position to discuss a major venture along this line in Texas with Dr. Struve. With luck this may be about the time paper is published.

Please keep me informed of events as they progress at the Bay.

Cordially yours,