

HYDROGEN-LINE OBSERVATIONS ON THE COMA CLUSTER

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In 1956 and 1958 Heeschén [1, 2] reported hydrogen-line radiation at 21 cm from the Coma cluster of galaxies. He found a maximum antenna temperature of 2 °K and gave a profile with a width of about 4 Mc/s. From his details, it seems clear that these results depend mainly on a large number of drift curves on a frequency of 1386.9 Mc/s, since the accuracy of other points of the profile was much lower. Because the intensity is low and near the limit of what can be observed with present-day receivers we decided to repeat some of the observations with the 21-cm equipment at Dwingeloo.

The first preliminary observations did not show the expected radiation at the above-mentioned frequency, using a comparison frequency 3.6 Mc/s below the signal frequency, but accuracy was low, about 0.5 °K. The method was the same as that used in extragalactic observations, i.e., fixed-frequency measurements on the cluster during 7 to 15 minutes, then on a comparison field 15 degrees away in right ascension, and so on. This method largely eliminates slow drift. Because of radar interference on neighboring frequencies no observations on other frequencies were made.

New and better observations were made in 1958 January and July after a careful check on the proper functioning and sensitivity of the receiver and on possible radar interference. The results of these two sets of measurements are given in the table below. In the first case a comparison frequency 3.6 Mc/s below the signal band was used, in the second case the comparison frequency was 4.3 Mc/s higher. In both cases some drift was present, but this did not influence the accuracy seriously. In the last case at some elevations we found an elevation influence on the zero level; observations, therefore, were made with two comparison fields on both sides of the source at the same elevation as the source and at least 15 degrees away. No systematic difference between the two comparison fields occurred.

Frequencies	Velocities	Noise difference
1386.4 (1382.8) Mc/s	+ 7200 (7960) km/sec	$T_a = -0.05 \pm 0.1 \text{ }^\circ\text{K}$
1387.0 (1391.3)	+ 7030 (6130)	+ 0.03 \pm 0.1 °K

No radiation was found, with a mean error of 0.1 °K. This accuracy and the better method of observations indicate that Heeschén's results may have arisen from a spurious effect. More observations on more frequencies are needed to conclude definitely that the hydrogen radiation from this cluster is less than 0.1 °K when observed with a 25-meter telescope.

REFERENCES

- [1] Heeschén, D. S. *Ap. J.* **124**, 660, 1956.
 [2] Heeschén, D. S., and Dieter, N. H. *Proc. I.R.E.* **46**, 234, 1958.