COMMENTS ON McCLAIN'S OBSERVATIONS OF IAU 17S2A

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Reference to Fig. 1, p. 20 of this symposium will show that a 1° beam directed toward the galactic centre receives a range of velocities that is not negligible. This is due to galactic rotation, which causes material in one edge of the beam to approach and in the other edge to recede.

Assuming a Gaussian antenna pattern and using the rotational velocities from *B.A.N.* no. 458, we can compute σ_A, the 'antenna dispersion'. If the beam is filled, this dispersion is what would be observed even if random motions were zero. Table 1 gives σ_A as a function of distance from the sun toward the galactic centre for the N.R.L. 50-ft. antenna. Identical values are obtained from circular orbits ($\phi = 0°$) and spiral orbits ($\phi = 4°$)

Table 1

r (kpc.)	σ_A (km./sec.)	r (kpc.)	σ_A (km./sec.)
0–3	$< \pm 1.0$	8.2	± 22.8
4	1.3	9	7.8
5	2.0	10	3.7
6	3.1	11	2.3
7	5.4	12	1.6
8	18.2	13+	< 1.0

If we define the velocity range of a Gaussian profile as corresponding to an intensity equal to 5 % of central intensity, then the range equals $\pm 2.5\sigma$. Assuming that the random motions have a dispersion of ± 10 km./sec., Table 2 gives the expected velocity range at different distances

Table 2

r (kpc.)	$2.5\sqrt{10^2+\sigma_A^2}$ (km./sec.)
0–6	± 25.0 to ± 26.3
7	± 28.5
8	± 52.0
8.2	± 62.3
9	± 31.8
10+	± 26.8 to ± 25.0

toward the galactic centre which should be observed with the N.R.L. 50-ft. antenna.

The general features of McClain's profile of I.A.U. 17S2A can be explained in terms of the figures in Table 2. The relatively small velocity range of the observed absorption is consistent with McClain's estimate of distance. The unabsorbed wings extending out to ± 60 km./sec. are probably due to material at the distance of the galactic centre being picked up in the edges of the beam. If this explanation is correct, a larger antenna should reduce the observed intensity of the unabsorbed wings, while making no change in the velocity range of the absorption.