radio source counts and it may therefore be concluded that intergalactic free–free absorption could be partly responsible for the effect observed at 2·1 MHz.

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Distances to the Pulsating Radio Sources

IN several of the recent discussions of pulsating radio sources, it is assumed that the distance of these objects is of the order of 100 pc or less. We wish to show that it is just as likely that these objects lie at distances at least 10 times greater.

The distance has been determined in the following way. The delay in arrival of the pulses has been measured at several frequencies. The change in arrival time with frequency can be explained entirely by a dispersion in group velocity in ionized gas. From this the integral $\int n_e dl$ is obtained, where n_e is the electron density and l is the distance. Typical values[1] are $\int n_e dl = 10$ cm^{-3} pc. There are reasons to assume that this gas is interstellar[2], although it cannot yet be ruled out that the gas is associated with the pulsar. We have no quarrel with the analysis to this point. The next step in the analysis has been to say that the average value of n_e in the interstellar medium near our region of the galactic plane is 0·1 cm^{-3}. From this a distance of 100 pc to the pulsating source follows.

We question the use of 0·1 cm^{-3} as an average value of the electron density in the interstellar medium. The only measurements available which bear on the electron density outside H II regions (we assume that the line of sight never passes through an H II region) are the measurements of absorption of low frequency radio waves[3,4]. On the assumption that the absorption is due to free–free transitions in hydrogen, one obtains a value $n_e^2 T_e^{-3/2} = 3{\cdot}5 \times 10^{-8}$ cm^{-6} °K$^{-3/2}$, where T_e is the kinetic temperature of the electrons. With different assumptions of the temperature we may obtain the values of electron density shown in Table 1. The values of the distance to the pulsating sources are also shown in Table 1, assuming $\int n_e dl = 10$.

Table 1. ELECTRON DENSITIES AND DISTANCES TO PULSATING SOURCES

T_e	n (cm^{-3})	l(pc)
10,000°	2×10^{-1}	50
1,000°	4×10^{-2}	250
100°	6×10^{-3}	1,700

The smaller distance rests on the assumption of an electron temperature of about 5,000° K. This temperature, which has not been measured, is obtained by analogy with H II regions, that is, the electrons are in a region ionized by stellar radiation where roughly the same cooling mechanisms are operative as in the H II regions, and therefore a similar temperature will be found.

Recently it has been argued[5,6] that the electrons are not in separate ionized regions but are in the same regions where neutral hydrogen is found. The neutral hydrogen is ionized by cosmic ray particles of low energy, and not by radiation. Present measurements of the cosmic ray flux in the low energy region are difficult to make because of the modulating effect of the interplanetary medium, but the best available corrections[7] indicate a flux sufficient to cause ionization of several per cent in neutral hydrogen of density $n_H = 2 \times 10^{-1}$ cm^{-3}, that is, an electron density $n_e \approx 10^{-2}$ cm^{-3}. This is consistent with a value $T_e \approx 200°$ K.

What the temperature of such a medium would be depends on the cosmic ray flux and on the density of the gas, so that the temperature is difficult to predict. It is most likely that no single temperature would characterize the interstellar medium. Observationally the 21 cm neutral hydrogen emission lines are only suitable for temperature determinations when combined with absorption line measurements made with a beam narrow enough so that the absorbing medium completely fills the beam.

While many questions remain concerning the interstellar medium, it does not seem to us justifiable to put any reliance on distances to the pulsating radio sources of less than 100 pc. Perhaps the problem should be turned around so that one first tries to determine a distance to these sources and then uses $\int n_e dl$ to determine the electron density in the interstellar medium.

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Spectral Changes on *HD* 125823

THE existing spectroscopic data on *HD* 125823 has recently been described[1]. Since the first spectra of this object were taken in 1908, the spectrum has varied between two extreme types which can be roughly described as B2 and B8 III, although the spectrum is never completely normal when examined in detail.

In May 1968 a series of spectrograms were taken on successive nights with the 110 Å mm^{-1} camera of the 32 in reflector of the La Plata Observatory. Oddly enough, the star shows a very short cycle of the order of 9 days. So far it has been possible to cover three cycles and during this time interval the behaviour has been periodic, that is, at the same phases the same spectra repeat exactly. It can therefore be assumed that the variation is periodic, although more observations are needed to settle this point definitely (Table 1).

Table 1. OBSERVATIONAL DATA FROM LA PLATA

Julian date 2,439,000 +	Spectral type	Julian date	Spectral type
977·7	B2V	986·6	B2V
980·7	B3p	987·7	B3p
981·7	B8p	988·6	B5p
983·7	B5p	989·6	B9p
984·6	B3p	991·6	B7p
985·6	B2V	997·7	B5p

If one accepts the idea of a strictly periodic oscillation, one can use the old observations[1] to derive an improved period. When this is done, the epochs of the earliest