

A DEEP SEARCH FOR YOUNG PULSARS IN THE GALACTIC PLANE AT 1400 MHz

T.R. Clifton, A.W. Jones and A.G. Lyne
 University of Manchester
 Nuffield Radio Astronomy Laboratories
 Jodrell Bank
 Macclesfield
 Cheshire SK11 9DL, United Kingdom

ABSTRACT. A new survey of the Galactic plane for pulsars has now been completed at Jodrell Bank at the relatively high frequency of 1400 MHz (Clifton, T.R. and Lyne, A.G. 1986, *Nature*, 320, 43). A further 8 new objects have been detected. The properties of these are summarized below:

PSR	P(ms)	err	DM	Long	Lat	err	Flux(mJy)
1735-32	768.50	1	60	356.5	-0.52	0.10	1
1806-21	702.413	5	380	9.4	-0.69	0.10	1
1809-175	538.35	2	720	13.0	0.35	0.10	3
1828-10	405.025	2	180	20.9	-0.52	0.10	1
1841-04	991.02	1	100	28.1	-0.52	0.10	1
1842-04	162.251	1	280	28.2	-0.69	0.10	3
1850+00	2180.3	1	840	33.6	0.00	0.10	5
1859+07	644.01	1	240	40.6	1.04	0.10	3

Although only 200 square degrees of the sky were searched, 62 pulsars in all were detected of which 40 were new discoveries. The new pulsars mostly have dispersion measures greater than 200 pc cm^{-3} and, although longitudes between $l=-5$ and $l=100$ were surveyed, 39 of the 40 new objects lie at $l < 41$. This shows that pulsars are far more common in the central regions of the Galaxy than hitherto appreciated. Most of the new pulsars will have escaped detection in previous surveys which were at around 400 MHz because of the extreme effects of interstellar scattering which broadens the pulses and because of the high galactic background emission at the low frequency. Many of the new pulsars still show the effects of interstellar scattering, even at this high frequency at which the broadening is reduced by a factor of about 150 compared with 400 MHz. This suggests that a still higher frequency is required in order to penetrate the innermost regions of the Galaxy.

Although the survey had good sensitivity for periods down to about 50 ms and reducing sensitivity down to periods of 4 ms, no pulsars were discovered having periods of less than 85 ms. However two of the new pulsars with periods of about 100 ms have characteristic ages of only about 20,000 years. Only 3 other radio pulsars have smaller ages and they all have supernova remnants associated with them. Since no strong radio emission is obvious in any continuum surveys around the two new pulsars, any associated supernova remnants probably have quite low surface brightness.