ABSOLUTE POSITIONS OF OH MASERS ASSOCIATED WITH HII REGIONS

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We have measured the absolute positions of five OH maser sources associated with HII regions, using the Jodrell Bank phase compensated radio linked interferometer (Norris, Booth & Davis, 1980); these are reproduced in Table 1. In addition, we have mapped the relative positions of the features in the OH spectra at 1665 MHz for all of the sources and at 1667 MHz for 3 of them (W3OH, NGC 7538 and W49). We are now able to compare the distribution of the OH masers in a given source with its radio continuum map and to investigate the proximity of masers in the 2 main line transitions and the H_2O masers.

The highest accuracy was achieved for the source W3OH shown in Figure 1. On the 15 GHz continuum map of Harris & Scott (1976) we have plotted the positions of the 1665 and 1667 MHz masers as well as the 6035 MHz features published by Moran et al. (1978). Several points emerge:

1. In all cases the OH masers are offset from the main continuum centre although they are usually located within the continuum envelope; W3OH (fig.1) has several features outside this envelope. Several authors, e.g. Elitzur & de Jong (1978), have suggested that the OH masers lie in a thin shell of dense dust and gas lying between shock and ionization fronts. The present observations are not entirely consistent with this idea and suggest that inhomogeneities due to magnetic

TABLE 1 OH SOURCE POSITIONS (1665 MHz)

OH Source (Velocity)	R.A. (1950)	Dec (1950)
W3OH (-45.1)	$02^h23^m16^s.317 \pm .011$	$61^o38'57''.78 \pm .13$
NGC 7538 (-59.9)	23 11 36.60 ± .02	61 11 49.67 ± .15
Orion A (7.1)	05 32 46.78 ± .02	-5 24 25.9 ± 1.7
ON2 (2.2)	20 19 51.93 ± .02	37 16 59.9 ± .3
W49(1) (20.9)	19 07 49.60 ± .03	09 01 16.1 ± 3.0
W49(2) (16.0)	19 07 58.04 ± .02	09 01 05.4 ± 2.9

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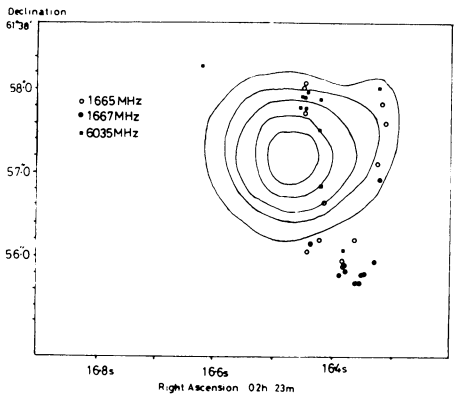

Fig. 1 The OH maser features plotted on the 15 GHz continuum Cambridge map of W3OH. The 6035 components are from Moran et al. (1978). All main line components are plotted relative to the 1665 MHz feature at -45.1 km s^{-1}.

fields and turbulence are important.

2. The 1665 and 1667 MHz masers are generally separate but show a small amount of overlap. Where this overlap occurs there is no obvious general relationship between component velocities. The same can be said of the relationship with the 6035 MHz masers in W3OH (Fig.1).

3. In general the OH and H_2O masers are displaced by a small but significant amount. However, in Orion there is strong evidence for a close association in position and velocity between a clump of OH features and an H_2O centre of activity (Norris, 1978).

4. The most likely pump mechanism for the OH masers is that due to collisions (e.g. Elitzur & de Jong 1978). Radiative mechanisms must be ruled out since the UV and IR photon rates at the distance of the masers are too low by at least an order of magnitude. Finally, chemical schemes are unlikely because of the general non-coincidence of OH and H_2O.

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