CIRCULAR POLARIZATION AT 1665 AND 1667 MHz TOWARDS OH MASERS IN NGC 6334N, NGC 7538N, NGC 7538S, AND G45.07+0.13

X. W. Zheng,[1,2] J. M. Moran,[1] M. J. Reid,[1] M. H. Schneps,[1]
J. A. Garcia-Barreto,[3] G. Garay[4]

[1] Harvard–Smithsonian Center for Astrophysics
[2] Astronomy Department, Nanjing University
[3] Universidad Nacional Autónoma de México
[4] European Southern Observatory

VLBI OH maser observations simultaneously in right and left circular polarization at the 1665 and 1667 MHz transitions were conducted by taking advantage of the multichannel capability of the Mk III system. The OH maser maps of the right and left circular polarization at both transitions were obtained toward the OH maser sources NGC 6334N, NGC 7538N, NGC 7538S, and G45.07+0.13.

We found five Zeeman pairs in NGC 6334N, one in NGC 7538S, and one in G45.07+0.13. The inferred magnetic field strengths range from 2 to 7 mG, respectively. For NGC 6334N, the magnitude of magnetic field is roughly constant over the source, and no field reversals are seen. The magnetic field in this source may be relatively homogeneous. The shift among features in the RCP and LCP spectra for NGC 7538N is less than 0.2 km s^{-1} and may represent a single partially polarized σ–component.

All four OH masers are associated with H_2O maser sources. The OH maser emission may be located closer to the center of the compact H II region than H_2O maser emission, but it is difficult to be more specific given the large error bars on the H_2O positions. The OH maser emission regions in NGC 7538N, NGC 6334N, and G45.07+0.13 are losely associated with the compact H II regions. The majority of OH spots are projected against the compact H II region within the half-power diameter. No radio continuum counterparts have been found for the OH source in NGC 7538S. One possible reason is that small HII regions less than $0\overset{''}{.}1$ in size have not yet or have just begun to form and are difficult to detect.

An interesting characteristic of our map of NGC 6334N (Figure 1) is that the majority of the higher velocity features lie in the core region. It appears that the velocities of the features systematically decrease from southwest to northeast (see Figure 2). The gradient is 8 km s^{-1} arcsec^{-1}. A rotating disk with an approximate mass 10 $M_{\odot}$ is inferred for this region. In most OH masers, there is little spatial correspondence between the features at two main line frequencies, even though there is velocity overlap in the spectra. Different transitions may come from the different layers surrounding the central star. However, in NGC 6334N, most of the maser spots in both transitions are coincident within 3×10^{15} cm. The turbulence or complicated movement of molecular clumps probably blend these layers.

M. J. Reid and J. M. Moran (eds.), The Impact of VLBI on Astrophysics and Geophysics, 263–264.

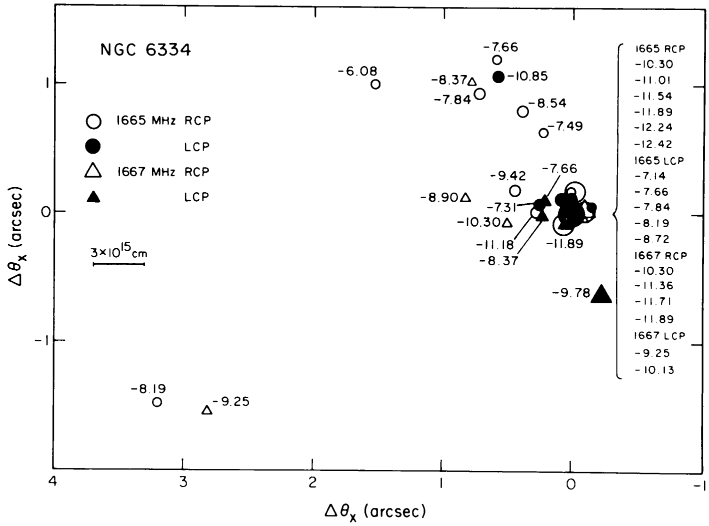

Figure 1. Map of OH masers at 1665 MHz towards NGC 6334N.

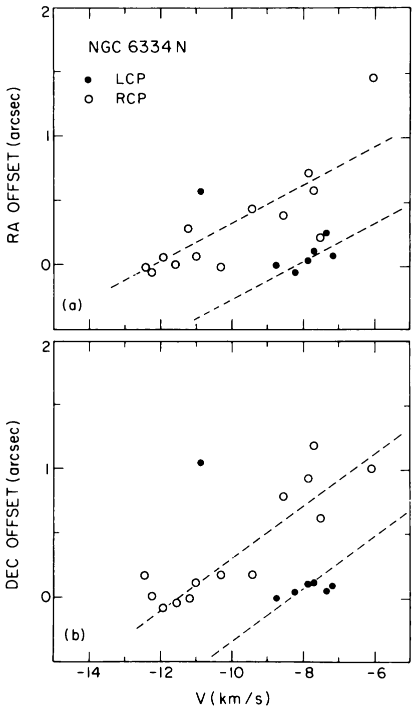

Figure 2. The RA and declination offsets versus velocity of maser features shown in Figure 1. The tendency of the features to cluster around the dashed lines suggests the presence of rotation and of a uniform magnetic field of strength ~ 5 mG.

https://doi.org/10.1017/S0074180900134655 Published online by Cambridge University Press