PROCEEDINGS OF SCIENCE

MERLIN Polarization Observations of OH Masers in W75S and K3-50

B. Hutawarakorn Kramer*
National Astronomical Research Institute of Thailand,Physics Building, Chiang Mai University, Chiang Mai 50200 Thailand
E-mail: busaba@narit.or.th

S. Nammahachak, O. Muanwong
Department of Physics, Faculty of Science, Khon Kaen University, Khon Kaen 40002 Thailand

R. J. Cohen
Jodrell Bank Observatory, The University of Manchester, Macclesfield, Cheshire SK11 9DL United Kingdom

N. Gasiprong
Department of Physics, Faculty of Science, Ubon Rajathanee University, Ubon Rajathanee 34190 Thailand

We present result of the MERLIN full polarization observations of the 18-cm OH Masers in W75S and K3-50. Both star-forming regions are clear examples of molecular disks and bipolar outflow structure, with OH masers embedded at the centre of the regions. The OH masers indicate an ordered magnetic field, in some cases aligned with bipolar outflow and some cases orthogonal to the direction of the outflow. The magnetic field deduced from Zeeman splitting of the OH maser lines shows a large scale order and is strong enough to play an important role in star formation process.

From planets to dark energy: the modern radio universe
October 1-5 2007
University of Manchester, Manchester, UK

*Speaker.

PoS(MRU)100

1. Observations

Previous MERLIN studies of OH masers associated with bipolar molecular outflow have provided evidence for rotating molecular disc structures perpendicular to the outflow direction, and evidence of twisted magnetic field lines (Hutawarakorn, Cohen & Brebner 2002; Hutawarakorn & Cohen 2005 and ref. therein). In this paper, we present MERLIN measurements of the ground state OH masers in W75S and K3-50. The sources were observed during 3 and 11-12 March, 1996 using seven telescopes of MERLIN. The data processing and analysis procedures were as described by Hutawarakorn & Cohen (1999).

2. Summary of Results

2.1 W75S

The distribution of OH masers shows that there is structure orthogonal to the CO bipolar outflow direction. Most of OH maser features show close matched positions with those measured using the VLA by Argon et al. (2000). Fifteen out of twenty features are highly polarized (> 50 %). Magnetic field values measured from Zeeman pairs are agree well with those of Fish et al. (2003) and show evidence of the field reversal. Another group of OH masers were also detected at the position R.A.(J2000)= $20^h39^m00^s.38$, Dec.(J2000)= $42^\circ24'37".1$.

2.2 K3-50

Almost all OH masers have velocities around 21 km s^{-1}, only 1720 MHz has velocities around 12.50 km s^{-1}. Analysis of OH maser polarization reveals 6 Zeeman pairs, complimentary to those of Fish & Reid (2006), and shows the evidence of field reversal across the region. Another group of 1720 OH masers were also found at the position R.A.(J2000)= $20^h01^m54^s.06$, Dec.(J2000)= $33^\circ34'13".8$.

References

[1] Argon A. L., Reid M. J., Menten K. M., 2000, ApJS, 129, 159

[2] Fish V. L., Reid M. J., Argon A. L., ApJ., 2003, 596, 328

[3] Fish V. L. Reid M. J., ApJ., 2006, 164, 99

[4] Hutawarakorn B., Cohen R. J., 1999, MNRAS, 303, 845

[5] Hutawarakorn B., Cohen R. J., Brebner G. C., 2002, MNRAS, 330, 349

[6] Hutawarakorn B., Cohen R. J., 2005, MNRAS, 357, 338

[7] Lai S. P., Girart J. M., Crutcher R. M., ApJ., 2003, 598, 392

[8] Phillips J. P., Mampaso A., A&A, 1991, 88, 189

[9] Winnberg A., Terzides C., Matthews H. E., AJ., 86, 410

[10] Wootten A., Andre P., Despois D., Sargent A., ASPC, 65, 294

[11] Uchida Y., Shibata K., 1985, PASJ, 1985, 37, 515

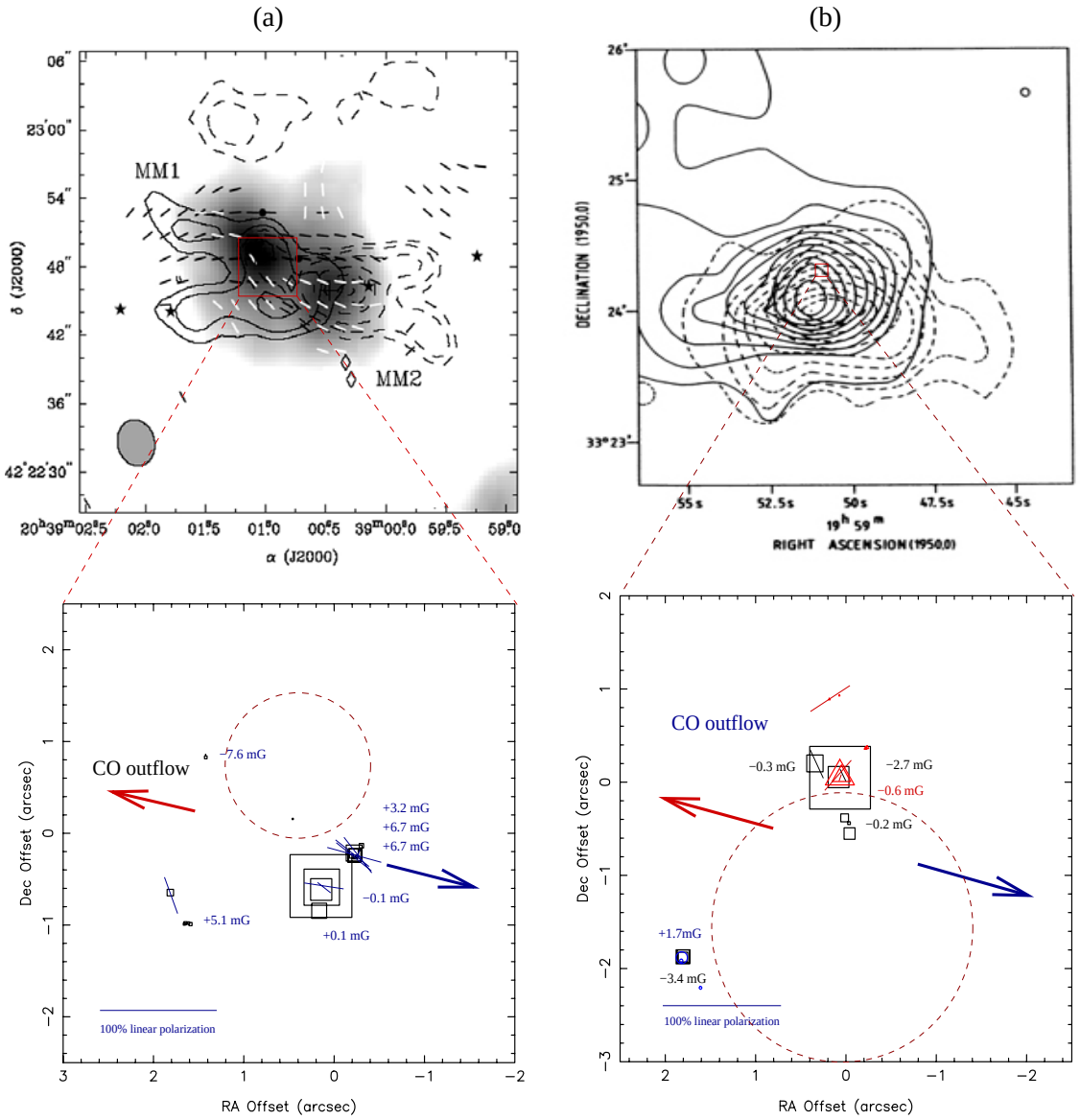

Figure 1: (a) The 1665-MHz OH masers are shown with polarization information. The square area is proportional to Stoke I flux of each feature. The direction of CO outflow is from Lai et al. (2003). The dotted circle indicates HII region area (Wootten et al. 1994). The positions are offset from (0,0) at R.A.(2000)=$20^h39^m00^s.97$, Dec.(J2000)=42°22'48".2. (b) Polarization information of the OH 1665-, 1667- and 1720-MHz masers in K3-50. Squares, triangles and circles show elliptically polarized masers. The direction of CO outflow is from Phillips et al. (1991). The dotted circle indicates HII region area (Winnberg et al. 1981). The positions are offset from (0,0) at R.A.(2000)=$20^h01^m45^s.73$, Dec.(J2000)=33°32'45".3.