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Full polarization analysis of OH masers at 18-cm toward W49 A star forming region

K. Asanok^{1,2}, B. Hutawarakorn Kramer^{1,3}, S. Etoka⁴, M. Gray⁴,
A.M.S. Richards⁴, N. Gasiprong⁵ and N. Naochang²

¹National Astronomical Research Institute of Thailand, 260 Moo 4, T. Donkaew, Amphur Maerim, Chiang Mai, 50180, Thailand
email: kitiyanee@narit.or.th

²Department of Physics, Faculty of Science, Khon Kaen University, Khon Kaen, 40002, Thailand

³Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany
email: bkramer@mpifr-bonn.mpg.de

⁴Jodrell Bank Center for Astrophysics, School of Physics and Astronomy, The University of Manchester, Alan Turing Building, Oxford Road, Manchester, M13 9PL, United Kingdom
email: sandra.etoka@manchester.ac.uk, malcolm.gray@manchester.ac.uk,
a.m.s.richards@manchester.ac.uk

⁵Department of Physics, Faculty of Science, Ubon Ratchathani University, Ubon Ratchathani, 34190, Thailand
email: ngasiprong@yahoo.com

Abstract. W49 A is a star-forming region (SFR) found in the constellation of Aquila. It contains 3 active regions: W49 North (W49 N), W49 South West (W49 SW) and W49 South (W49 S). We present preliminary results from two epochs of all four ground-state OH masers (e-)MERLIN observations. The first epoch of observations was done in full-polarization mode with MERLIN in 2005 while the second epoch was obtained only in dual circular polarizatoin during the test observations of the upgraded e-MERLIN in 2013. The overall spatial distribution of masers in both epochs are in good agreement. We found several new high velocity maser features up to 34 km s^{-1} and -28 km s^{-1} . The magnetic field strengths are between 1.1 to 10.8 mG. All three sources show evidence of magnetic field reversal.

Keywords. ISM: HII regions, kinematics and dynamics, magnetic fields, molecules; stars: formation

1. Summary of the results

A Spatial distribution of all four ground-state (1612, 1665, 1667 and 1720 MHz) OH masers in W49N, W49S and W49SW, observed with e-MERLIN in 2013, is shown in Figure 1. The overall spatial distribution of the masers is in good agreement with the previous MERLIN observation in 2005 and the VLA observation in 1991 by Argon et al. (2000). We also detected new 1720-MHz transitions in W49N and W49S and new 1612-MHz transitions in W49SW which were detected by the VLA earlier. New maser sites were also found in all transitions (see Figure 1). With wider velocity coverage of e-MERLIN, new High velocity maser features up to 34 km s^{-1} and -28 km s^{-1} are found in W49N and W49S.

In this paper, we report only the magnetic field and polarization information of the 1612-MHz, 1665-MHz (only in W49SW) and 1720-MHz transitions observed in full-polarization mode with MERLIN in epoch 2005. The magnetic field strengths range from 1.1 mG (in W49S) to 10.8 mG (in W49N). All three sources show evidence of mag-

netic field reversal. W49SW has highest percentage of linear polarization (up to 40 %) while W49N has lowest (less than 10 %). Further detailed studies (e.g. comparison of Zeeman measurements in all transitions in both epoch and interpretation of the physical condition of each sources) will be reported in Asanok et al. (in prep.).

References

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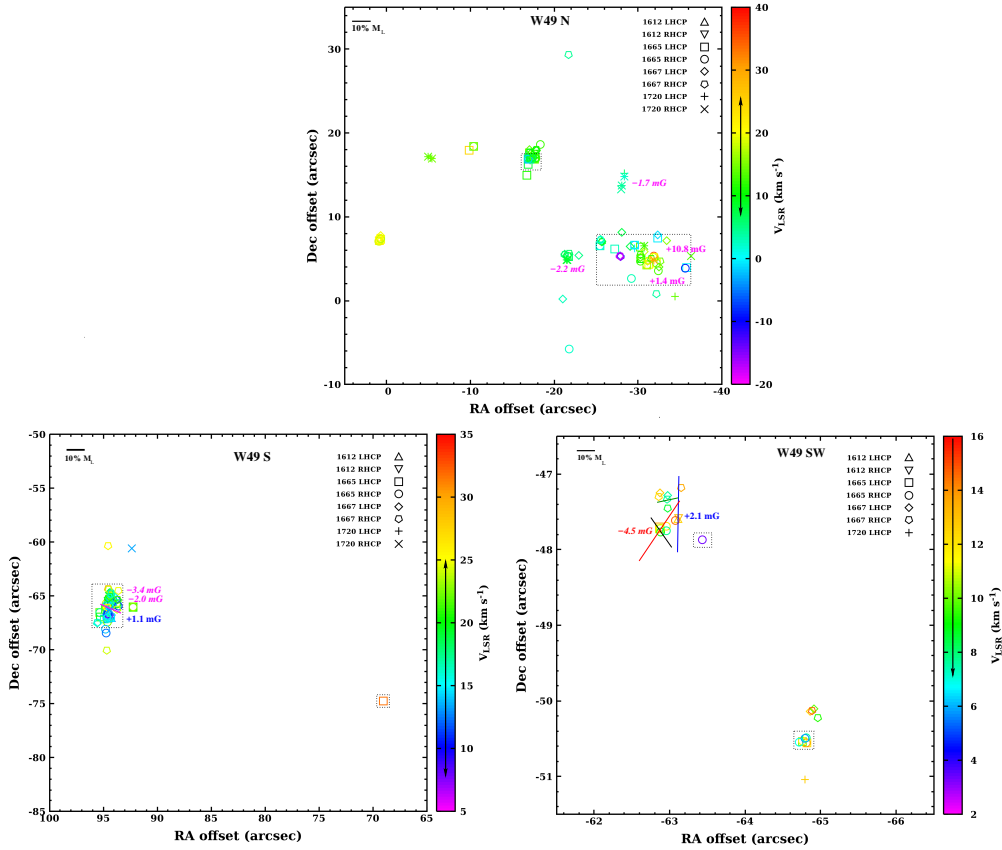


Figure 1. Positions and velocities of all four ground-state OH masers in W49A from e-MERLIN observations in 2013. The positions are offset from (0,0) at R.A.(J2000)=19h 10m 15.308s, Dec.(J2000)=+09°06′08.″4822. The dash line boxes indicates the new maser features. A vertical arrow in the color bar indicates velocity range covered in Argon et al. (2000). The linear polarization vectors and magnetic field strengths obtained from MERLIN (2005) are shown blue (1612 MHz), red (1665 MHz), green (1667 MHz) and magenta (1712 MHz). The plus and minus signs indicate the direction of the magnetic field whether are toward (-) or away (+) from us.