

OH mainline maser polarisation properties of post-AGB stars

Jessica M. Chapman¹ Ioannis Gonidakis¹, Rachel M. Deacon²
and Anne Green²

¹CSIRO Astronomy and Space Science
PO Box 76, Epping, NSW 2122, Australia
email: jessica.chapman@csiro.au

²University of Sydney, School of Physics
NSW 2006, Sydney, Australia

Abstract. The Parkes 64-m telescope was used to study the OH mainline polarisation properties at 1665 and 1667 MHz for a sample of 36 evolved stars, identified by their far-infrared and OH 1612 MHz maser properties as likely post-AGB stars.

Keywords. masers, polarization, stars:AGB and post-AGB, radio lines:stars

1. Observations and results

We observed thirty-six sources that exhibit 1612 MHz OH emission and according to their infrared properties can be categorized as likely post-AGB stars. The sources were bright and evenly spread over four infrared selection groups (Deacon *et al.* 2004, Deacon 2006).

Observations were taken in 2004 using the Parkes telescope in two 12-hour observing sessions, using two orthogonal linear feeds. A bandwidth of 4 MHz was centered at 1666.4 MHz to cover both the OH 1665 and 1667 MHz mainline transitions, with 4096 spectral channels, giving a velocity resolution of 0.175 km s⁻¹. Each source was observed for ten two-minute scans to cover a range of parallactic angles.

OH mainline polarization was detected in 21 out of the 36 sources observed, with 14 detections at 1665 MHz and 13 at 1667 MHz. For the former emission, 13 sources were found to be circularly and 11 linearly polarized, while for the latter the number of detections were 15 and 18 respectively (Table 1). In total, circular polarization was observed in 42% of the sources and linear in 50% of them.

2. Linear polarisation from post-AGB stars

As seen in Fig. 2 linear polarisation from post-AGB stars is typically detected as a small number of very narrow features. These are not always associated with corresponding circularly polarised features; in some cases only linear polarisation is detected. For three

Table 1: OH mainline polarisation detection statistics

OH line	Total Observed	Polarised	Circular	Linear
1665	24	14	13	11
1667	31	13	7	10
Total	36	21	15	18

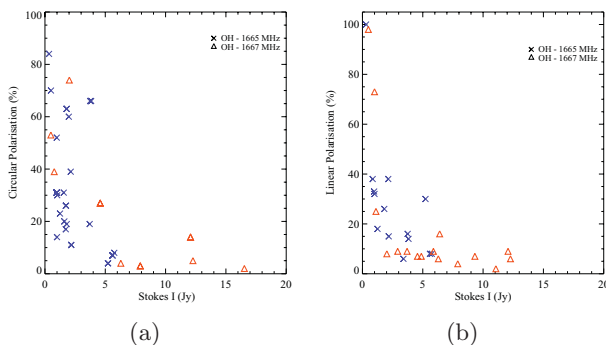


Figure 1: Percentage polarisation for maser features at 1665 MHz (crosses) and 1667 MHz (triangles). (a) Circular polarisation. (b) Linear polarisation.

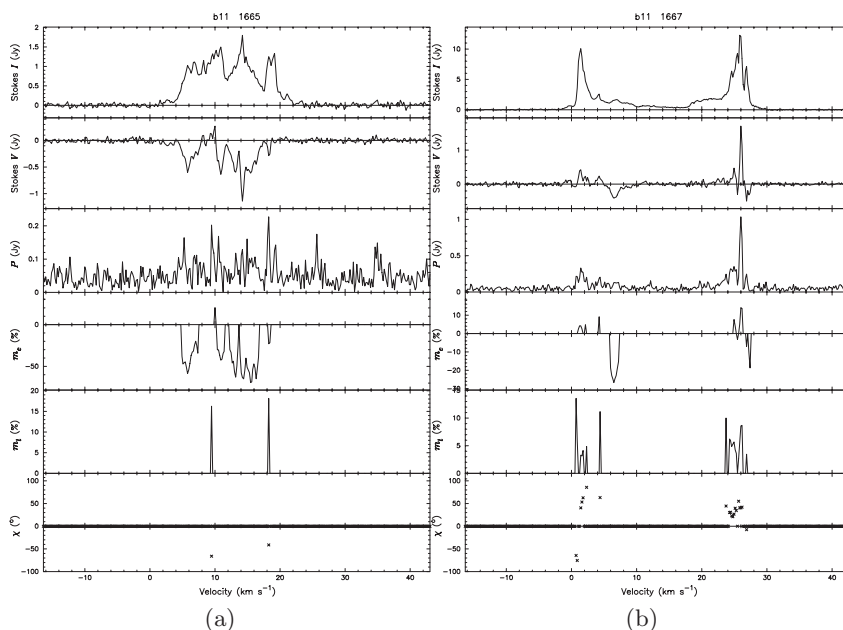


Figure 2: An example of the polarisation spectra obtained for source b11. From top to bottom the panels are: Total Intensity (I), Circular Polarisation (V), Total Linear Polarisation (P), Percentage Circular Polarisation (m_c), Percentage Linear Polarisation (m_l) and Polarisation Position Angle (χ).

sources in this sample, b292 (1665 MHz), v87 (1665 MHz) and v189 (1667 MHz) we have detected spectral features that are $\sim 100\%$ linearly polarised (Fig. 1). These features may correspond to Zeeman ‘ π ’ components.

References

- Deacon, R. M., Chapman, J. M., & Green, A., 2004, *ApJS*, 155, 595
 Deacon, R. M., 2006, PhD Thesis, The University of Sydney