

25 GHz methanol masers in regions of massive star formation

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Abstract. The bright 25 GHz series of methanol masers is formed in highly energetic regions of massive star formation and provides a natural signpost of shocked gas surrounding newly forming stars. A systematic survey for the 25 GHz masers has only recently been carried out. We present the preliminary results from the interferometric follow up of 51 masers at 25 GHz in the southern sky.

Keywords. masers, stars: formation

1. Introduction

Class I methanol masers are widely accepted to be associated with outflows from young stellar objects. However, this association has only been observed in a small number of sources (Plambeck & Menten 1990, Kurtz *et al.* 2004, Voronkov *et al.* 2006) due to the lack of accurate absolute positions of class I masers. A proper test on the association between class I methanol masers and outflows is needed on a larger sample of sources for which accurate positions are known.

The bright 25 GHz masers are rare but models suggest they trace higher density and temperature regions in outflows than other class I methanol masers (Sobolev *et al.* 2005). Voronkov *et al.* (2007) searched for the J = 5 line in the 25 GHz E methanol maser series towards the majority of southern regions of massive star formation. We followed up 51 of these detections by observing the J = 2 to J = 9 lines in the same series. We used the new broadband correlator on the Australia Telescope Compact Array, which allows observation of multiple molecular lines simultaneously.

2. Preliminary Results

We find that all 51 sources exhibit emission in at least one of the eight maser lines allowing us to determine their exact positions. Our preliminary results show that at least eight of the sources exhibit emission in five or more transitions. We also find that five of the emission sources are associated with previously reported HII regions and other molecular masers. We have also obtained polarization data on all our sources.

Preliminary analysis of one source selected from our list as an example, known as G351.24 + 0.67, shows the relative flux across the transitions to be similar to that found in sources such as G343.12 – 0.06 and G357.96 – 0.16 (Britton *et al.* in this proceedings). Figure 1 shows the spectra of the J = 3, 5 and 6 lines for G351.24 + 0.67. This is an interesting source as there are multiple components within the individual spectra and it is known to lie within the complex star forming region NGC 6334.

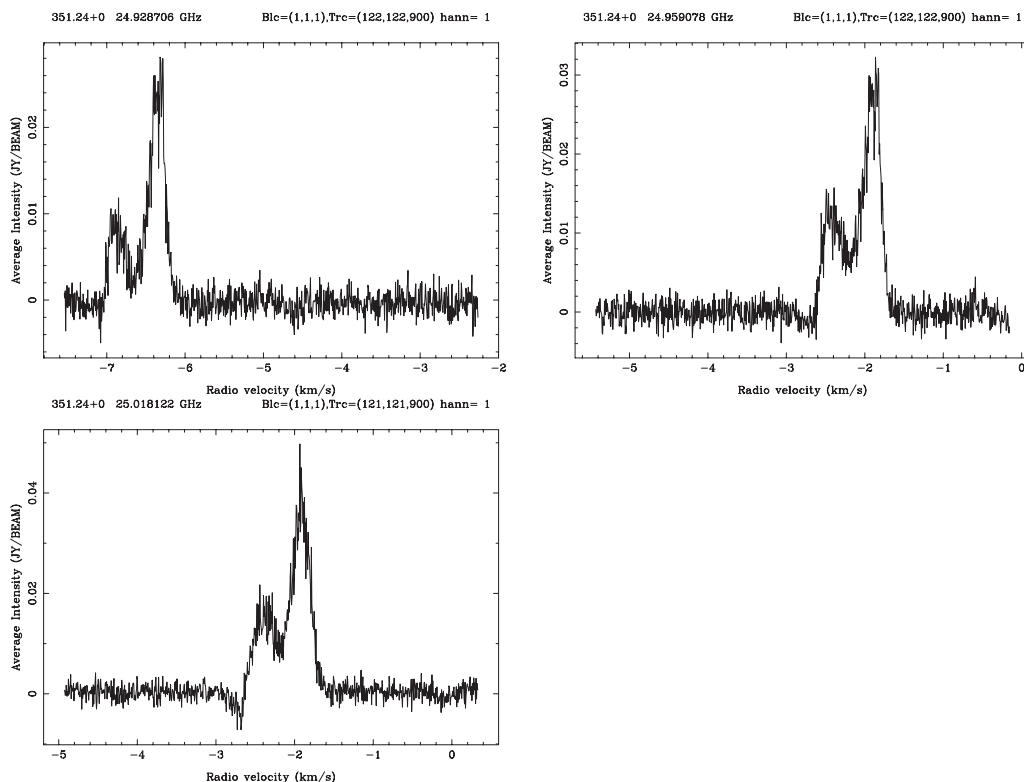


Figure 1. Spectrum of J = 3,5, & 6 methanol maser lines in G351.24 + 0.67.

We intend to release the positions of all 51 sources in a new catalogue providing the first accurate positions of 25 GHz methanol masers in the southern sky.

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