Summer Student VLA Time Project Details

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Today hundreds of extrasolar planets are known to exist. Detection of radio emission from extrasolar planets would open a new window of physics to be explored with these worlds (Bastian et al. 2000, Lazio et al. 2004, Farrell et al. 1999, Zarka 2007). To open this window, many attempts to find extrasolar planet radio emission have occurred (see Bastian et al. 2000, Grießmeier et al. 2007, and references therein). These searches, which have been previously conducted at many frequencies, have yet to be successful.

Most searches for radio emission from extrasolar planets have been conducted to search for cyclotron-maser radio emission. Most emission from extrasolar planets is thought to be emitted at tens to hundreds of MHz (Farrell et al. 1999, Grießmeier et al. 2007, Lazio et al. 2004). More often than not, the searches target the parent star and look for emission; typically none is found (e.g. George & Stevens 2007). However, the observations that were taken in the D configuration were not ideal for a low frequency search. Instead of searching in 4 or P band, we searched at L-band, which provided resolution comparable to some past searches for extrasolar planet radio emission, ~45 arcseconds (e.g. George & Stevens 2007, Bastian et al. 2000).

Since most extrasolar planets are thought to not emit strongly in L-band, the pool of possible candidate extrasolar planets to observe was severely limited. Using scaling relations from Lazio et al. (2004), we selected two possible sources which could potentially produce detectable radio emission in L-band, one of which was not mentioned by Lazio et al. (2004) because of its recent discovery in 2005. These sources are high mass planets, with lower mass limits of ~9 $M_{Jupiter}$ (Gallan et al. 2005, Butler et al. 2006). The two sources which were observed were HD33564 b and HIP 75458 b.

The observations were taken in continuum mode, at the standard frequencies for L band with the VLA. Each source was observed for ~1.5hours. The observations were calibrated in AIPS using flux and phase calibrators.

The two observations had a confusion rms of ~0.1 mJy. No coincident source was immediately identified. A search for time varying source was also attempted. This was

done by splitting up the observations at timescales of ~5, ~10, ~15, and ~30 minutes. Still, from the resulting images no source was identified. There was a source "nearby" (~35 arcsec) to HD33564. However, this is likely radio emission from an IRAS source F05142+7911.

It is somewhat unsurprising that no emission was identified, when compared to other past searches. Given that no source was observed, again suggests that extrasolar planet radio emission would be better searched for in larger configurations and at lower frequencies. There are several potential reasons as to why no source was observed. We could have observed when the suspected time variable emission (Zarka et al. 1996) was weak. Also, if we had observed during a time when the emission was peaking, then this would suggest that there is some break down in the Lazio et al. (2004) relations. However, because again no source was identified, this remains speculation.

References

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