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COMPACT RADIO SOURCES IN THE VICINITY OF THE ULTRACOMPACT HII REGION G78.4+2.6

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Using the Very Large Array (VLA) at 3.6 cm, we observed the UC HII region G78.4+2.6. In the vicinity of the cometary HII region (VLA 1), we identify four new compact radio sources (named VLA 2 to VLA 5) above the 5σ level .

Figure 1 shows the cometary HII region and the four compact radio sources. G78.4+2.6, is an ultracompact (UC) ionized (HII) region with cometary morphology (Kurtz et al. 1994) with position $\alpha(2000) = 20\ 19\ 39.224$, $\delta(2000) = 40\ 56\ 36.53$ and its kinematic distance range from 1.7 to 3.3 kpc (Wilking et al. 1989; Shneider et al. 2006; Kurtz et al. 1994). From the radio continuum emission G78.4+2.6 seems to be ionized by a B0-B0.5 ZAMS star (Kurtz et al. 1994; Tej et al. 2007).

The source IRAS 20178+4046 seems to be associated with the UC HII region (Kurtz et al. 1994). Tej et al. (2007) presented a multiwavelength study toward this infrared source, they suggest that a scenario with possible different evolutionary stages of star formation is present toward this region. From their near infrared data they proposed the presence of nine early type sources with spectral types B0.5 or earlier around the IRAS source. We looked for near-infrared counterparts, for the compact radio sources detected by us, using the Spitzer 3.6 μm band image and the 2MASS Point Source Catalog (PSC), around each VLA source.

Of the nine NIR sources reported by Tej et al. (2007), only one coincides in positon with a VLA source (VLA 1). Tej's source number 1 could be associated with VLA 4 within $1''.5$. We study the time-variability of the four fainter radio continuum sources, in a time scale of 10 hours, following the technique described in our paper (Neria, Gómez, & Rodríguez 2010). Only the source VLA 5, shows clear evidence of variability. This suggests that VLA 5 could be a low mass pre-main sequence (PMS) star. We detected another group of five sources (named VLAN 1 to VLAN 5) in the vicinity of G78.4+2.6, wich appear located about $3'$ to the northwest of the HII region. Two of these sources (VLAN 2, VLAN 3) exhibit extended emission. VLAN 1 also displays some signs of extended emission though the morphology is more compact.

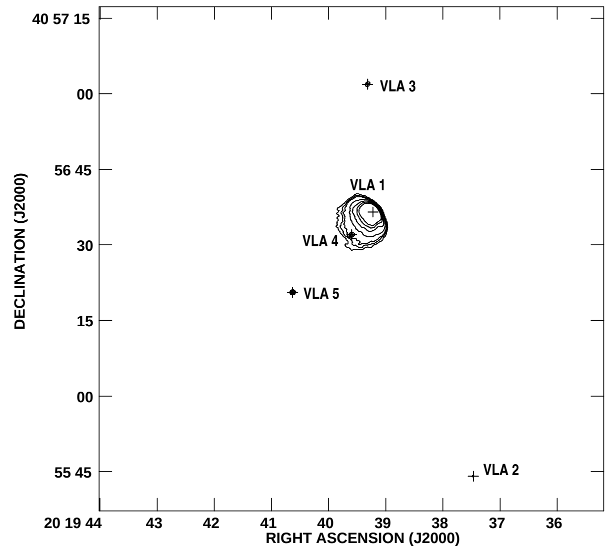

Fig. 1. Contour image of the 3.6 cm continuum emission from G78.4+2.6, showing the four compact radio sources. The contours are −5, 5, 10, 15, 30, 50, 70 and 90 times 10 μJy beam^{-1}, the average rms noise of the image.

In order to gain understanding about the nature of the VLAN sources, we looked for any counterparts using the Strasbourg Astronomical Data Center (CDS), the Spitzer 3.6 mm band image and the NRAO VLA Sky Survey at 1.4 GHz (NVSS) but we do not find any counterpart. The morphology of VLAN 1-VLAN 3 suggest that these sources could be a cluster of radio galaxies, or HII regions surrounding massive stars but more observations are needed in order to clarify the nature of these sources.

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