The Low Surface Brightness Galaxy HIPASS1126-72

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Abstract. The low surface brightness galaxy HIPASS1126-72 was detected in the HI Parkes All Sky Survey (HIPASS). The galaxy was previously listed in the Southern Galaxy Catalogue under the name SGC1124.8-7221. This galaxy represents a class of galaxies that we will readily detect in the HIPASS survey, which have low surface brightness in the optical, but are easily detectable in neutral hydrogen.

1. Introduction

The HIPASS survey is being conducted at the 64m Parkes Radio-telescope in Australia, mounted with a 13 beam "multibeam" detector (Webster et al 1998, Barnes et al, 1998). The beam size for the survey is $\sim$ 14', and the velocity resolution is 18 km s^{-1}. HIPASS1126-72 was detected by eye during routine searches for galaxies in the HIPASS data cubes. The HIPASS detection represents the first HI observation of this galaxy, and it was selected for higher resolution observations on the ATCA since its velocity profile was only just resolved in the HIPASS data. The velocity profile from HIPASS can be seen in Figure 1(a).

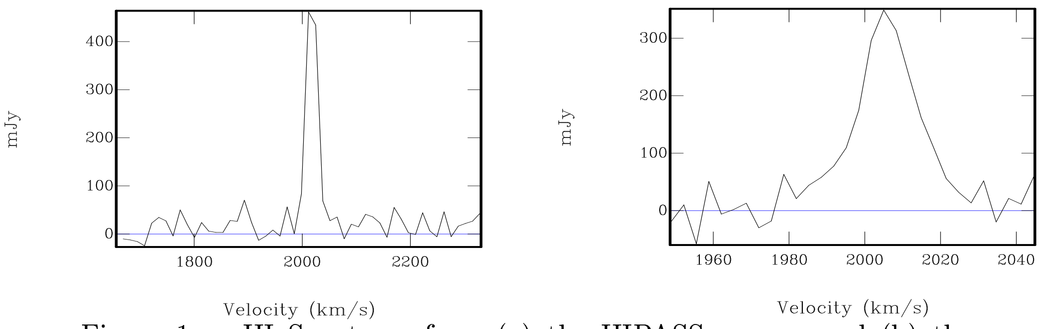

Figure 1. HI Spectrum from (a) the HIPASS survey, and (b) the Compact Array.

2. Observations

To obtain higher resolution of HIPASS1126-72, about 7 hours of data was taken in May 1998 at the Australia Telescope Compact Array (ATCA), with a 750m array. The resultant beam size was $\sim 60'' \times 40''$, and the velocity resolution was 3.3 km s^{-1}. The data reduction package MIRIAD was used to reduce the ATCA data. The HI distribution overlaid on the optical image (Fig. 2), shows a depression in the HI distribution at the optical center of the galaxy, which is also the brightest star forming region. This suggests the HI has been depleted in the formation of stars in this region. The ATCA spectrum can be seen in Figure 1(b).

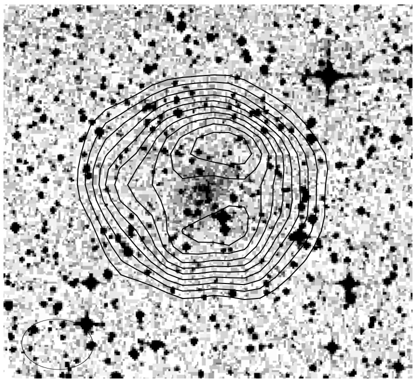

Figure 2. HI Spectrum overlaid on the DSS image (image size: $6.4' \times 6'$) - the contours are 7% contours, starting with the peak flux.

HIPASS1126-72 was observed in B and R-bands at the Siding Spring 40-inch telescope in January, 1998. The resulting images can be seen in Figure 3. We can see that the galaxy is more luminous in the B-band, which is a characteristic common to low surface brightness galaxies (de Blok, 1997). Ellipse fitting to the B band image gives an inclination of $\sim 25^o$, and the central surface brightness in B was found to be $\sim$23.8 mag arcsec^{-2}. This galaxy lies close to the galactic plane, and foreground stars partially obscure one side of the galaxy; these are especially prominent in the R-band image, and have obstructed us from doing photometry in that band. The galactic extinction at these galactic coordinates (l=296,b=-10) is 1.42 magnitudes in the B-band (Schlegel et al, 1998).

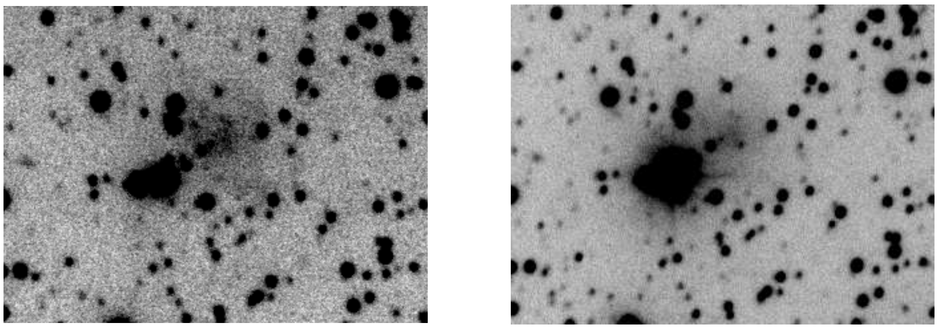

Figure 3. MSSSO 40' Observations: (a) Image in B-band (3600s); (b) Image in R-band (1800s).

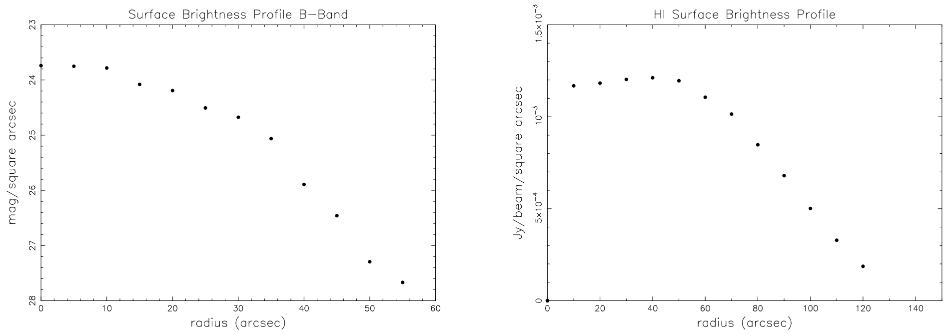

Figure 4. (a) Surface Brightness Profile B-band and (b) HI Surface Brightness Profile.

3. Characteristics of HIPASS1126-72

Position (J2000): RA: 11:26:28 Dec: -72:37:15 (ATCA)
Central Surface Brightness (B-band): 23.8 mag arcsec^{-2}
Heliocentric Velocity: 2012 km s^{-1} (ATCA)
Velocity Width (20%, 50%): 27 km s^{-1}, 16 km s^{-1} (ATCA)
HI Mass: $3.4 \times 10^9 M_\odot$ (HIPASS)

The 20% velocity width is less than twice the velocity resolution of the HIPASS survey. Thus the survey will detect galaxies unresolved in velocity, making interference rejection harder. Figure 4. shows the HI emission extends to a much greater radius (120") than the optical light (40-50"). The HI surface brightness is almost constant to the optical radius of the galaxy, then it decreases.

4. Conclusions

HIPASS1126-72 has one of the narrowest integrated profile widths of any known galaxy. The low velocity width appears to be the result of its low inclination, low gravitational potential and low surface density of star-formation. In general, the HIPASS survey is very sensitive to such low surface brightness, HI-rich galaxies. Optical and radio follow-up observations of such galaxies will do much to elucidate their nature.

5. Acknowledgements

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