Gas & Galaxy Evolution
ASP Conference Series, Vol. 240, 2001
J.E. Hibbard, M.P. Rupen, and J.H. van Gorkom, eds.

The HI Distribution in Two Blue Compact Dwarf Galaxies

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Abstract. We present VLA HI imaging of two actively star forming dwarf galaxies, Haro 2 and Haro 4, and include a map of the CO distribution of Haro 2 obtained with OVRO. We discuss some preliminary results based on the distribution of the neutral and molecular gas and its relation to star formation activity.

With the aim of studying the relation between star formation episodes in dwarf galaxies and the interstellar medium, we mapped the neutral gas distribution of Haro 2 (Mrk 33) and Haro 4 (Mrk 36). The data were obtained with the NRAO-VLA. In addition, we made a CO($1 \rightarrow 0$) map of Haro 2 using the millimeter interferometer of the Owens Valley Radio Observatory (OVRO). The VLA and OVRO surveys will be fully described in Bravo-Alfaro et al. (in prep.). We measured the HI column density and compared this with the empirical threshold for star formation, i.e., the minimum gas column density necessary for star formation to occur, commonly believed to be around 10^{21} cm^{-2} (see, e.g., Taylor et al. 1994). We find that the neutral gas distributions of both galaxies show regions of high HI column density ($> 2\times10^{21}$ cm^{-2}) near the centers of the optical counterparts (see Fig. 1).

The CO($1 \rightarrow 0$) distribution for Haro 2 (superposed on the HI contours in Fig. 2) confirms that star formation is likely restricted to the central regions. However, higher resolution HI observations are needed to allow a detailed comparison with the CO. The HI and H_2 contents of Haro 2 are very similar, with values around 10^8 M$_\odot$. Interestingly, the molecular gas, as outlined by the CO map, shows an arclike feature running from SE to NW along the major axis of both the HI and optical light distributions. However, this is *perpendicular* to the kinematic major axis defined by the velocity field of the HI data.

References

Taylor, C.L., Brinks, E., Pogge, R.W., & Skillman, E.D. 1994, AJ, 107, 971

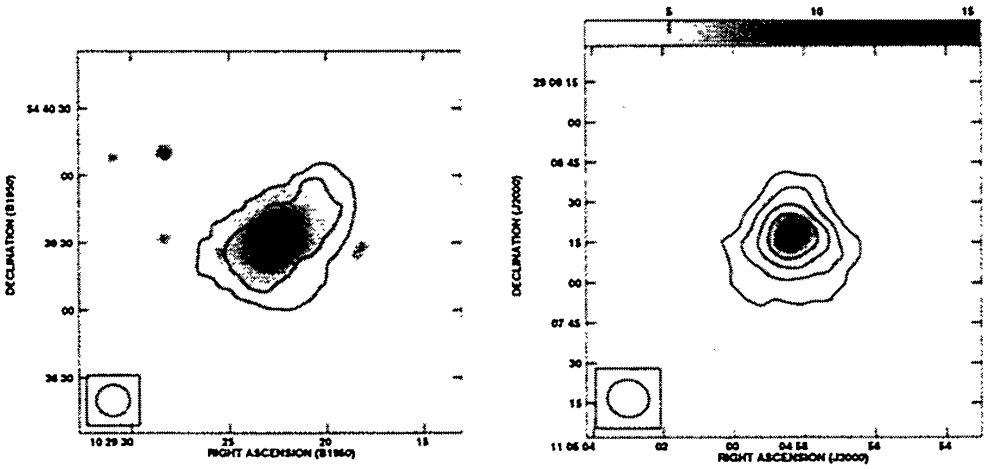

Figure 1. HI column density distribution of Haro 2 (left) and Haro 4 (right), superposed on DSS B-band greyscale images. For Haro 2 the contours are 1.2 (2.5σ), 7.2, 14.8, and $21.6\times10^{20}\,\mathrm{cm}^{-2}$, and for Haro 4, 1.2 ($2.5\sigma$), 4.7, 9.4, 14.0, and $18.7\times10^{20}\,\mathrm{cm}^{-2}$. The FWHM of the beam is indicated in the lower left-hand corner and measures $15.5'' \times 14.0''$.

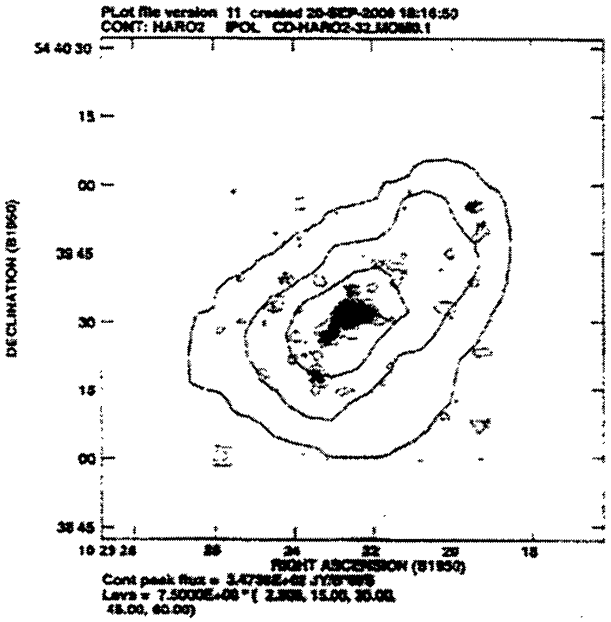

Figure 2. Zeroth moment map of the CO($1 \rightarrow 0$) emission of Haro 2 shown in grey scale and thin contour lines, which are drawn at multiples of $1.5\sigma_{ch}\Delta v_{ch}(n_{ch})^{0.5}$ ($0.52\,\mathrm{Jy\,beam}^{-1}\,\mathrm{km\,s}^{-1}$). The FWHM of the beam is indicated by the ellipse and measures $3.26'' \times 2.64''$. The large-scale contours outline the HI as in Fig. 1.