RevMexAA (Serie de Conferencias), **44**, 15–15 (2014)

XIV Latin American Regional IAU Meeting (Florianópolis/SC, Brazil, 25-30 November 2013)
Editors: A. Mateus, J. Gregorio-Hetem & R. Cid Fernandes

GAS, DUST, AND STAR FORMATION IN THE IR DUST BUBBLE S 24

C. E. Cappa[1,2], V. Firpo[3], G. A. Romero[2], M. Rubio[4], and J. Vasquez[1,2]

Based on molecular line and dust continuum data obtained with the APEX telescope, and IR images at different wavelengths, we investigate the gas and dust distributions in the environs of the IR dust bubble S 24 and determine the main physical parameters of the molecular gas.

The IR dust bubble S 24 is a full filamentary shell detected in the IRAC emission at 8 μm (Churchwell et al. 2006). This bubble, 24″ in radius, is placed at 3.7±0.8 kpc, and coincides with the IR source IRAS 16487-4423, classified as UCHII.

Using the Atacama Pathfinder EXperiment (APEX), located in the Puna de Atacama, Chile, we obtained ^{12}CO(2-1) and ^{13}CO(2-1) line data, and dust continuum emission at 870 μm (using the LABOCA bolometer) of a region of 4′×4′ centered on the bubble. Herschel images at 70 and 160 μm (PACS) and 250, 350, and 500 μm (SPIRE), as well as IRAC-Glimpse and MIPS images, were also used.

The line data allowed us to detect a molecular shell around the bubble at the systemic velocity of –44 km s^{-1}, with a radius of 54″ (or 1.0 pc at 3.7 kpc). Figure 1 shows an overlay of the IRAC emission at 8 μm and the ^{13}CO integrated emission in the interval [–45.7,–42.3] km s^{-1}, revealing the molecular gas environment.

The distribution of the cold dust, as imaged using LABOCA data at 870 μm and Herschel-Spire data, correlates with that of the molecular gas. We estimated a molecular mass $M_{H2} \simeq 1.4\times10^4$ M_o linked to the bubble, and a molecular ambient density of 1.2×10^4 cm^{-3}. This region seems to be the densest one, and probably the less evolved, in the S 21-S 24 complex.

The presence of warm dust in the inner part of the bubble, as shown by the emission at 24 μm from MIPSGAL (Carey et al. 2005), indicates the existence of excitation sources. This characteristic has been found in other IR dust bubbles (e.g. Watson et al. 2008). This is in line with the detection of radio continuum emission at 843 MHz (SUMSS), which suggests the existence of ionized gas inside the bubble. These facts, along with the high ambient density, suggest that a compact HII region has developed in the region. The emission at 8 μm from IRAC clearly delineates a photodissociation region at the interface between the ionized and molecular gas.

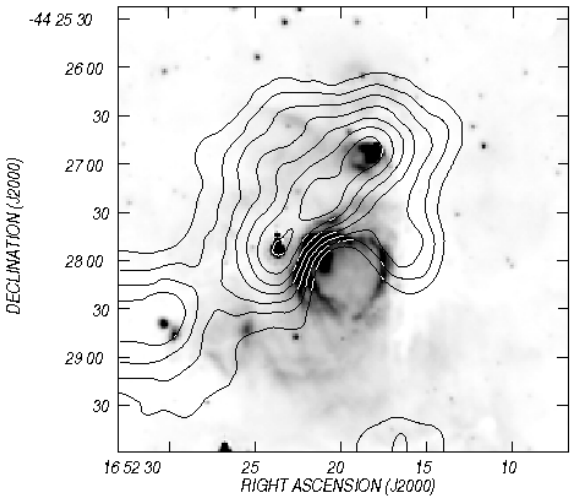

Fig. 1. Overlay of the IRAC emission at 8 μm (grayscale) and the integrated emission of ^{13}CO(2-1) in the velocity interval [–45.7,–42.3] km s^{-1}. Contour levels are 15.0 to 30.0 K km s^{-1}, in steps of 2.5 K km s^{-1}.

The presence of different signs of star formation reveals a region of active star formation.

Acknowledgements. VF acknowledges support from the Faculty of the European Space Astronomy Centre (ESAC). This project was partially financed by CONICET of Argentina under project PIP 02488 and UNLP under project 11/G120, and CONICYT of Chile through grant No. 1080335.

REFERENCES

Carey, S.J., et al., 2005, in American Astronomical Society Meeting Abstracts Vol. 37 of Bulletin of the American Astronomical Society, MIPSGAL: A Survey of the Inner Galactic Plane at 24 and 70 microns, Survey Strategy and Early Results. p. 1252

Churchwell, E., et al. 2006, ApJ, 649, 759

Watson C., et al. 2008, ApJ, 681, 1341

[1]Instituto Argentino de Radioastronomía, CCT-La Plata CONICET, Argentina (ccappa@fcaglp.unlp.edu.ar).

[2]Cátedra de Medio Interestelar, Facultad de Ciencias Astronómicas y Geofísicas, UNLP, Paseo del Bosque s/n, 1900 La Plata, Argentina.

[3]Universidad de La Serena, La Serena, Chile.

[4]Departamento de Astronomía, Universidad de Chile, Chile.