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MSX IMAGES OF STELLAR WIND BUBBLES

J. Vasquez[1,2] and C. E. Cappa[1,2]

We analyzed MSX images of the environs of some optical ring nebulae around WR stars to investigate the presence of photodissociation regions (PDRs). Here we present preliminary results for some nebulae.

Studies of the molecular gas distribution in the environs of optical ring nebulae around WR stars have shown the presence of molecular material associated with some optical ring nebulae and HI interstellar bubbles (e.g. Cappa 2006).

UV photons with energies in the range 4.5 to 13 eV emitted by the massive stars originates photodissociation regions (PDRs) at the interface between the ionized and adjacent molecular regions (Tielens & Hollenbach 1985; Rathborne et al. 2002). Polycyclic aromatic hydrocarbons (PAHs) survive in these regions, where they absorb the strong UV radiation leaked from the HII regions and radiates. The mid-IR emission, where some of the PAH features appear, can then help to reveal the existence of PDRs.

With the aim of identifying PDRs bordering optical ring nebulae around WR stars, we analyzed MSX images and ^{12}CO data in the area of the HII regions. The Midcourse Space Experiment (MSX) satellite obtained images in four IR bands centered at 8.28μm (A-band), 12.13μm (C-band), 14.65μm (D-band), and 21.3 μm (E-band), with a resolution of $18\farcs4$. The ^{12}CO data have an angular resolution of $9'$ (Dame et al. 2001). We studied the HII regions RCW 49, related to the open cluster Westerlund 2 and WR20b (van der Hucht 2001); W 43 associated with WR121a; and the surroundings of WR19a.

RCW 49. The MSX images in the A-band reveals two partial shells associated with the open cluster Westerlund 2 and WR 20b, respectively. The brightest region corresponds to an elliptical half-shell around Westerlund 2, a rich open cluster containing many O-type stars and WR 20a (Moffat et al. 1991). The whole region is shaped by the strong stellar winds of Westerlund 2 and WR 20b. There are a number of arc-like bright IR filaments located at $\sim 10'$ from the central region. The ^{12}CO emission distribution within the velocity interval 0.0–6.5 km s^{-1} shows two maxima bordering RCW 49 and the A-band emission. The presence of molecular gas encircling both the ionized and the band A emission suggests the existence of a PDR at the interface between the ionized and molecular gas.

W 43 and WR 121a. WR121a belongs to a dense stellar cluster (Blum et al. 1999). The IR distribution in the A-band shows three clumps projected onto WR 121a, coincident with a radio continuum peak detected at 4.9 GHz, and a ring-like filament that breaks out from this region. The IR filament surrounds the radio emission region. A PDR has probably developed encircling the ionized gas.

The surroundings of WR 19a. The distribution in bands A and E shows a ring-like structure around WR 19a with the radio continuum emission projected inside the IR shell. The ^{12}CO emission integrated within the range 7.8–20.8 km s^{-1} presents a region of low emission centered near WR 19a and a number of maxima projected just outside the region emitting in the radio continuum. The overlay of ^{12}CO with the A-band emission distribution reveals that the molecular gas is projected onto the outer border of the IR ring. As in the case of RCW 49, a PDR is suggested to be present at the interface between the ionized and CO emissions.

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[1]Instituto Argentino de Radioastronomía, La Plata, Argentina (pete@iar.unlp.edu.ar).
[2]Facultad de Ciencias Astronómicas y Geofísicas, UNLP, La Plata, Argentina.