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THE ISM AROUND THE GALACTIC WOLF-RAYET STARS WR3 AND WR140

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The stellar winds from Wolf-Rayet (WR) stars and its massive progenitors, inject along their lifetimes an enormous amount of mechanical energy into there surrounding interstellar medium.

Using interferometric data obtained with the Super Synthesis Telescope of the Dominion Radio Astrophysical Observatory (SST-DRAO, Penticton, Canada) we have examined in great detail the matter distribution of the neutral hydrogen along the line of sight to the galactic WR stars WR3 (HD 9974) and WR140 (HD 193793).

Contrary to what is expected from a theoretical standpoint, the interstellar bubbles associated with these objects are markedly aspherical, being the WR star at an eccentric position with respect to the centroid of the H I cavity. Typical axial ratios for these cavities are ≥ 2. A dual-lobe structure present within the main H I void seems to be a new puzzling characteristic present in the cavities related to both WR stars. A similar feature has already been noticed in the H I bubble observed to be related to WR6 (Arnal & Cappa, 1996, MNRAS in press).

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TEMPORAL EVOLUTION OF THE H_2 ABUNDANCE IN THE INTERSTELLAR MEDIUM

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We calculate the abundance of molecular hydrogen (H_2) for a wide range of interstellar conditions, including the following cases: *i)* constant density and temperature, *ii)* constant density and variable temperature (isochoric case), and *iii)* constant pressure (isobaric case). Starting with a diffuse atomic medium, the time evolution of the H_2 abundance can be followed with $dn_{H_2}/dt = R_f - R_{Ph,d} - R_d$, where R_f is the formation rate of H_2 on interstellar grains, $R_{Ph,d}$ is the photodissociation rate, and R_d is the collisional dissociation rate. The formation and collisional dissociation rates depend on the gas temperature and density, and a self-consistent treatment of the problem should include the effects of H_2 cooling. Photodissociation of interstellar H_2 is initiated by absorption of discrete lines of the Lyman and Werner series, and within the clouds the general interstellar radiation field is quickly attenuated at those wavelengths. As the optical depth increases, the photodissociation rate decreases and becomes negligible at large optical depths ($\tau_v > 1$). Also, in the absence of local energy sources, at large optical depths the collisional dissociation rate becomes negligible (i.e., R_d tends toward zero at temperatures below $T \sim 2000°$ K). For all three cases considered, we find that the time required to convert atomic to molecular hydrogen is longer than the timescale for a number of cloud formation mechanisms. For the isochoric case we find that the molecular formation timescale can be written as a power-law of the total density, $t_{for} = A_0(n/1\ \mathrm{cm}^{-3})^\alpha$ yr, with $A_0 = 1.06 \times 10^{10}$ and $\alpha = -1.02$. Similarly, for the isobaric case, the formation timescale can be written as $t_{for} = B_0(P/10^{-12}\ \mathrm{dyn\ cm}^{-2})^\beta$ yr, with $B_0 = 1.7 \times 10^8$ and $\beta = -0.88$.

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THE DENSE INTERSTELLAR MEDIUM IN THE CENTRAL 600 PC OF THE MILKY WAY

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The CO ($J = 1 \mapsto 0$) and HCN ($J = 1 \mapsto 0$) rotational transitions were surveyed towards the central 600 pc ($l \times b = 4.3° \times 0.5°$) of the Galactic center (Jackson, Heyer, Paglione, & Bolatto 1996, ApJ, 496, L91), using the FCRAO 14-m telescope equipped with the QUARRY 5×3 focal plane array of receivers. The survey was sampled at 50″ (2 pc) spatial resolution in both lines. Given the extremely dissimilar dipole moments of both molecular species (and thus their critical densities to collisional excitation), the HCN emission traces gas 100 times more dense than the CO emission.

Both species have similar longitude distributions peaking at the position of the well known Galactic center cloud complexes: Sgr A, Sgr B, Sgr C and the $l = 1.5$ complex. The HCN emission ($n_{cr} = 5 \times 10^5\ \mathrm{cm}^{-3}$) has smaller galactic latitude scale

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