

# Warm molecular gas in the M17 SW nebula

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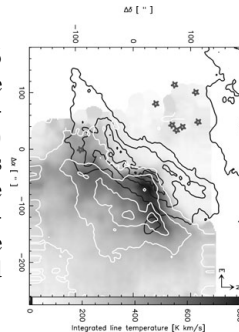
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**Abstract.** High resolution maps of the  $^{12}\text{CO } J = 6 \rightarrow 5$  line and the  $[\text{C I}]^3 P_2 \rightarrow ^3 P_1$  ( $370 \mu\text{m}$ ) fine-structure transition in the Galactic nebula M17 SW are presented. The maps were obtained using the dual color multiple pixel receiver CHAMP<sup>+</sup> on the APEX<sup>†</sup> telescope.

**Keywords.** galactic: ISM, galactic: individual: M17 SW, molecules:  $^{12}\text{CO}$ , atoms:  $[\text{C I}]$

Observations of mid- $J$  molecular lines are used to trace the warm (50 to few hundred K) and dense gas ( $n(\text{H}_2) > 10^5 \text{ cm}^{-3}$ ) across the interface region of the M17 SW nebula. Figure 1 shows the transition between the ionization front, traced by the 21 cm emission (Brogan & Troland, 2001, ApJ, 560, 821), the atomic gas traced by the  $[\text{C I}]^3 P_2 \rightarrow ^3 P_1$  transition and the molecular gas traced by the  $^{12}\text{CO } J = 6 \rightarrow 5$ . The warm gas extends up to a distance of  $\sim 2.2$  pc from the M17 SW ridge. The structure and distribution of the  $[\text{C I}]$  map indicate that its emission arises from an interclump medium with densities of the order of  $10^3 \text{ cm}^{-3}$ . The warmest gas is located along the ridge of the molecular cloud, close to the ionization front. The peak emissions of the  $^{12}\text{CO } J = 6 \rightarrow 5$  line and  $[\text{C I}]$  are  $\sim 850 \text{ K km}^{-1} \text{ s}$  and  $\sim 280 \text{ K km}^{-1} \text{ s}$ , respectively. These maps, along with the  $^{13}\text{CO } J = 6 \rightarrow 5$  and  $^{12}\text{CO } J = 7 \rightarrow 6$  lines, also observed with CHAMP<sup>+</sup>, are reported in Pérez-Beaupuits *et al.* (2009, A&A, *accepted*, arXiv:0910.4937v2).

**Figure 1.** Grey scale map of the  $^{12}\text{CO } J = 6 \rightarrow 5$  line in M17 SW, with  $9.4'' \times 9.4''$  resolution. The *black* contour lines correspond to the 21 cm continuum emission reported by Brogan & Troland (2001) with  $10'' \times 7''$  resolution. The *white* contour lines correspond to the  $^3 P_2 \rightarrow ^3 P_1$   $370 \mu\text{m}$  fine-structure transition of  $[\text{C I}]$  ( $9.4'' \times 9.4''$  resolution). The contour levels are the 25%, 50%, 75% and 90% of the peak emissions. The *open stars* indicates the O and B ionizing stars.



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