

Warm molecular gas in the M17 SW nebula

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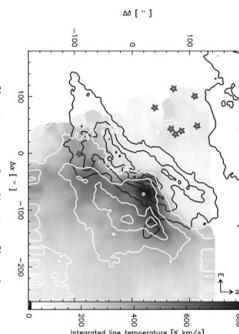
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Abstract. High resolution maps of the $^{12}\text{CO } J = 6 \rightarrow 5$ line and the $[\text{C I}]^3 P_2 \rightarrow ^3 P_1$ ($370 \mu\text{m}$) fine-structure transition in the Galactic nebula M17 SW are presented. The maps were obtained using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

Keywords. galactic: ISM, galactic: individual: M17 SW, molecules: ^{12}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 ~ 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 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⁺, 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.



Acknowledgements

We are grateful to the MPFIR team and the APEX staff for their help and support during and after the observations. We are grateful to C. Brogan for providing the 21 cm map, and to A. Baryshev and W. Boland for their contribution in building CHAMP⁺. Construction of CHAMP⁺ is a collaboration between the Max-Planck-Institut für Radioastronomie Bonn, SRON Groningen, the Netherlands Research School for Astronomy (NOVA), and the Kavli Institute of Nanoscience at Delft University of Technology, with support from the Netherlands Organization for Scientific Research (NWO) grant 600.063.310.10.

[†] This publication is based on data acquired with the Atacama Pathfinder Experiment (APEX). APEX is a collaboration between the Max-Planck-Institut für Radioastronomie, the European Southern Observatory, and the Onsala Space Observatory.