

Aperture Synthesis Observations of The Galactic Center 50-km·s⁻¹ Molecular Cloud

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INTRODUCTION

Molecular clouds in the Galactic center region are distributed mainly along the Galactic plane and have filamentary shapes with several clumps (Bally et al. 1987, Tsuboi et al. 1989). The "50-km·s⁻¹ molecular cloud (M-0.02-0.07)", which is located ~3' east from Sgr A West, is one of most remarkable clumps on these molecular filaments. The intimate relation between this cloud and Sgr A East has been mentioned by many authors (e.g. Ho et al. 1986). Several compact HII regions are located toward the cloud (Ekers et al. 1983). The recombination line velocities correspond to the molecular line velocities in the cloud (Goss et al. 1987). Thus this cloud is one of active star forming regions near the Galactic center.

We observed the 50-km·s⁻¹ molecular cloud in CS J=1-0 emission line (48.991 GHz) using the Nobeyama Millimeter Array (NMA) to reveal the detailed structure of the star forming regions near the Galactic center.

RESULTS

The results are as follows:

- (1) The 50 km·s⁻¹ cloud is mainly composed of a few kinky and curved molecular filaments. In addition, an expanding shell-like structure was found in the cloud (Fig. 1), which may represent the interfaces between expanding HII regions and the ambient molecular clouds.
- (2) The morphological compensation between the 50-km·s⁻¹ cloud and Sgr A East are clearly demonstrated and the very large velocity width and gradient of the cloud are found in this region (Fig. 2). These results suggest they are physically interacting with each other.
- (3) The well-shaped circular appearance of the expanding shell (Fig. 1) suggests that the strength of the magnetic field at the cloud is much weaker than the expected value, 1 mGauss, from the radio morphology of the Vertical filaments and G0.18-0.04 in the Galactic Center Arc (Yusef-Zadeh and Morris, 1987b).

References

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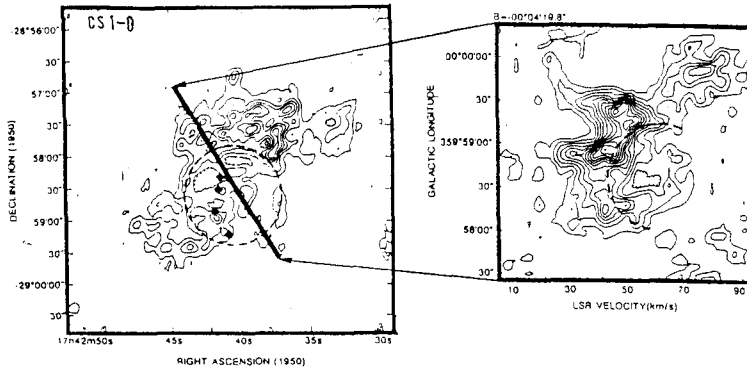


Figure 1: A velocity integrated intensity of $V_{LSR}=57.4$ to 67.0 km·s⁻¹ in CS $J=1-0$ emission line. The spatial resolution is $8.5'' \times 10''$ ($\phi=-34^\circ$). The contour interval is 105 mJy·beam⁻¹. The shell-like structure with $D=1.6'$ or 4.1 pc are shown (broken line). The positions of the compact HII regions are shown by diamonds. Position-velocity diagrams along lines are also shown.

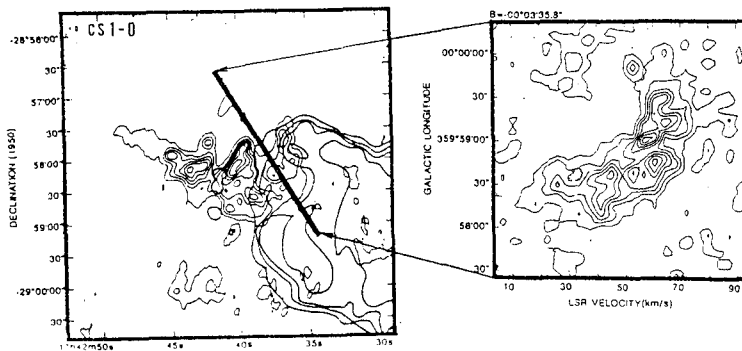


Figure 2: A comparison between the CS $J=1-0$ line emission of $V_{LSR}=28.7$ to 38.3 km·s⁻¹ (thin contours) and the 5-GHz continuum emission (thick contours; Yusef-Zadeh and Morris, 1987a). The contour interval of CS $J=1-0$ line emission is 140 mJy·beam⁻¹ and the contour levels of the 5-GHz continuum are 30 , 80 , 100 , and 150 mJy·beam⁻¹. Position-velocity diagrams along lines are also shown.