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EXPANDING HEMISPHERE IN ORION-KL HOT CORE — CS(2–1) OBSERVATION WITH NMA —

Y. MURATA[1], R. KAWABE[2], M. ISHIGURO[2], K.-I. MORITA[2],
T. HASEGAWA[3], M. HAYASHI[4]
[1] *The Institute of Space and Astronautical Science*
[2] *Nobeyama Radio Observatory*
[3] *The Institute of Astronomy, University of Tokyo*
[4] *Department of Astronomy, University of Tokyo*

ABSTRACT We have made aperture synthesis observations of CS(2–1) emission using the Nobeyama Millimeter Array (NMA), and obtained $\sim 2'' \times 3''$ (0.005 × 0.008 pc) resolution image to investigate the velocity structures of Orion-KL. We found not only well-known expanding doughnut but the expanding hemisphere in the Orion-KL hot core.

The map of CS (2–1) line (ν = 97.981 GHz) toward Orion-KL (R.A. [1950] = $5^h32^m47.0^m$, decl. [1950] = $-5°24'22''$) were obtained from December 1989 to March 1990. The velocity resolution and field of view of the observation were 0.96 km s^{-1} and 70 $''$ (FWHM), respectively. The maps were made using natural weighting by the CLEAN method, and corrected a primary beam attenuation. The resultant beam size and the noise level of the map are $3.1'' \times 1.9''$ with P.A. = 8° and 3.0 K, respectively.

Figure I shows the total intensity map of CS(2–1) line integrated over −16.2 – 28.7 km s^{-1}. Figure II shows the position velocity maps along the lines with the position angle of −60°, which is perpendicular to the CS disk (Hasegawa *et al.* 1984). The lines cover over the hot core emission at intervals of 2.5$''$. The velocity extensions of each position become larger from SW to NE. The panels from (a) – (c) show incomplete ring features in the position velocity map, and the rings become larger from (c) to (a) (SW to NE). The ring is 20 – 30 km s^{-1} × 8$''$ in size. The ring structure in panels (b) and (c) is almost complete, and three quarters of the ring show stronger emission. The bottom-right quarter of the ring in the southern higher velocity part (0$''$ – 5$''$ from the center and 10 – 30 km s^{-1} in V_{LSR}) has weak emission. In panel (a), the ring is clearly seen in the bottom left and top right quarters.

As suggested by Migenes *et al.* (1989), the velocity structure of the hot core in NH_3 is consistent with the model that predicts the hot core emission is located along walls of a thick cylinder which is expanding at a velocity of about 10 km s^{-1}. However, the velocity structure from the SE to the NW direction is not consistent with the model. Fig. II(b), (c) have the feature traced by an ellipse which represents the expanding motions of the hot core. If these velocity structures come from an inclined expanding ring, the velocity structure would be like that in Fig. II(a), and only the bottom-left and the top-right quarters of the ellipse would be seen. This indicates that the edge of the expanding ring has the shell expansion region and has a hemispheric shape.

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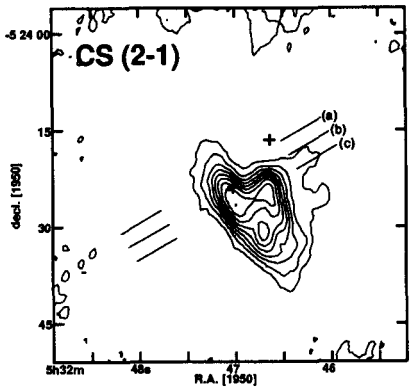
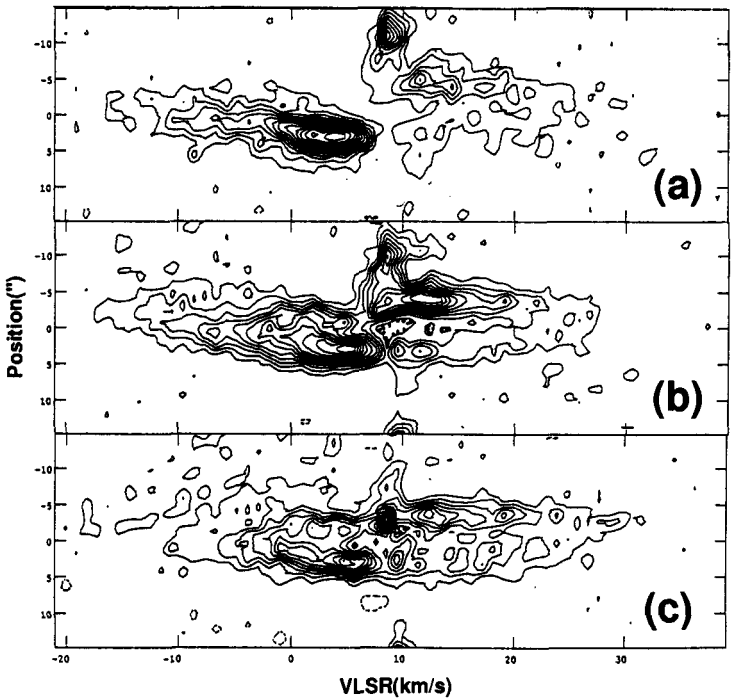


FIGURE I Integrated intensity map of Orion-KL in CS(2-1) line. Contour levels are every 100 K km s^{-1} from 200 K km s^{-1}. Two crosses show the positions of BN and IRc2. Three lines indicates where the the position velocity maps in Fig. II are made.

FIGURE II Position velocity maps of the hot core along the lines with the position angle of $-60°$. Reference position is IRc2 projected on the cut lines.



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