CS(J = 2-1) OBSERVATIONS OF B335

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CS(J = 2-1) observations of B335 are carried out using the NRO 45-m telescope with a 16" beam. We get many self-reversed profiles with good S/N ratio. Assuming that this region consists of a core and a halo, we get the molecular hydrogen density and the CS relative abundance in the halo. The CS wings are located within the cavity of the CO wing (Goldsmith *et al.* 1984).

B335 is an isolated star forming region accompanied by a clear bipolar flow. In order to study physical conditions in the central region of B335 we have got a cross map with the CS(J = 2-1) line which has clearly self-reversed profiles in this region (Snell *et al.* 1982). These profiles suggest that the center of B335 consists of two regions: (1) the core region in which the gas density is greater than 10^4 cm^{-3} and excitation temperature is high; (2) the halo region in which the gas density is lower than 10^4 cm^{-3} and the excitation temperature is low. We assume that the intensity from the core gas is absorbed by the halo gas and so the self reversed profiles are formed. From the analysis considering line transfer we got the excitation temperature for both regions and the optical depth only for the core region. Furthermore, we derived the molecular hydrogen density, the CS molecular abundance and the mass of the halo region using a large velocity gradient model. These results are shown in Table 1.

The CS profiles consist of two peaks. In the southern region the redder peaks are stronger than the bluer ones, but in the northern region the redder ones are weaker. This systematical change suggests a rotation of the core region. This result is in contradiction with a result based on NH_3 line observations (Menten *et al.* 1984). Nevertheless the rotation velocity is probably very small, because the change is enhanced by the absorption in the halo gas.

The CS wings are prominent and broadest (2.5 km s^{-1}) at 20" (0.03 pc at the distance of 300 pc) northeast of the far infrared source (Keene *et al.* 1983). The high-velocity wings are probably present along the east-west line and seem to continue toward the region where the CO high-velocity wings are seen. Nevertheless no high-velocity wing was found along the north-south line. Thus these CS wings probably show that the gas flow originates from a region closer than 10^{17} cm from the far-IR sources and that they are physically related to the bipolar flow.

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TABLE I

(a) THE HALO		(b) THE CORE	
size* (pc×pc)	0.31×0.38	size (pc×pc)	0.23×0.34
optical depth	2	T_{ex} (K)	5.2
T_{ex} (K)	3.2		
N(CS) cm^{-2}	4×10^{12}		
n(H_2) cm^{-3}	$10^{4.0}$		
X(CS)**	10-(9.3-8.8)	* Lower limit.	
mass ($M_\odot$)	$\gtrsim$ 7	** The relative CS abundance.	

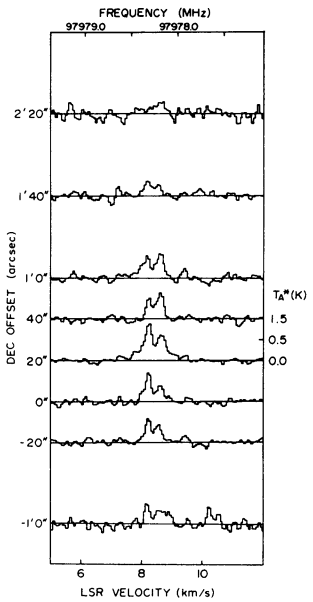

Fig. 1. Profiles of the CS(J =2-1) line in the north-south line. The coordinates of the center are α(1950) = $19^h34^m34^s$, δ(1950) = 7° 27'00".

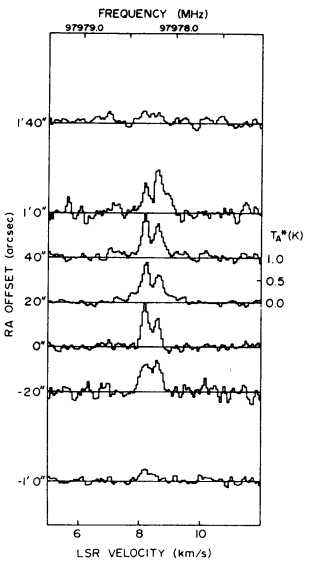

Fig. 2. Profiles of the CS(J = 2-1) line in the east-west line.

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