CO MOLECULAR CLOUDS IN THE REGION OF GL490

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GL490 is a solitary infrared source toward a heavily obscured region. The source exhibits indications of energetic mass outflows of the ionized and molecular gas (e.g. Simon *et al.* 1981, Lada and Harvey 1981). Generally, GL490 is considered as a young stellar object as suggested by the association with dense molecular gas (Morris *et al.* 1974, Kawabe *et al* 1984). In order to understand the distribution of the molecular gas around GL490, we have undertaken an extensive mapping in the J = 1-0 CO and ^{13}CO lines with a 3' beam (the Nagoya 4-m telescope) and a 15" beam (the 45-m telescope).

It has been known that the CO emission toward GL490 has two components at V(LSR) = -12 km/s and -20 km/s, but it was not clear if the two are associated with each other (Bally 1985). We present evidence that indicates that the -20 km/s cloud is actually associated and is dynamically interacting with the -12 km/s cloud. The strongest indication for the association is given by the detection of broad CO emission of ∿ 10 km/s extent at the southern edge of the -20 km/s cloud. Declination-velocity cuts obtained with the 4-m and the 45-m telescopes are shown in Figure 1. The broad CO emission is spatially localized within ∿ 3' in radius ($\lesssim$ 0.5 pc for an assumed distance of 900 pc) and has a bipolar nature. The spectral line shape and the distribution are, however, definitely different from those of usual CO outflows. The broad CO emission most likely comes from a shock front produced by the interaction between the -20 km/s and -12 km/s clouds.

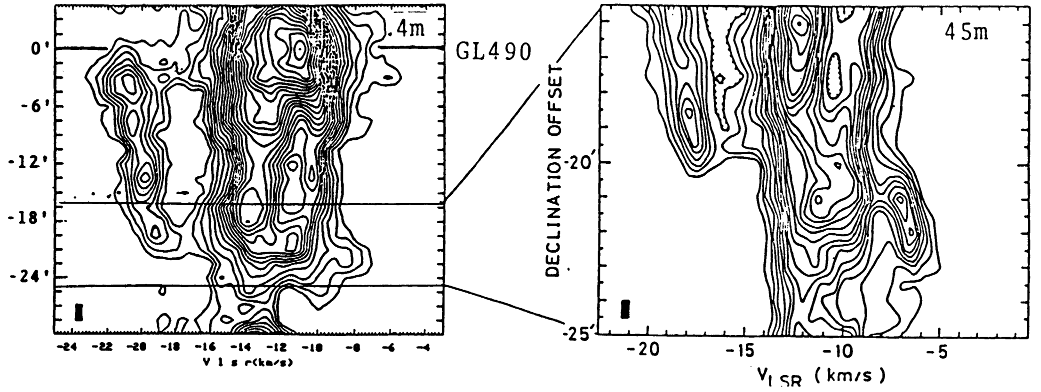

Fig. 1. Velocity declination cuts of the GL490 CO clouds.

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We discuss the following models for explaining this phenomenon: (1) cloud-cloud collision, and (2) energetic, long-term ($\gtrsim$ 5×10^5 yr) active event in the region of GL490. The unusually low ^{13}CO intensities in the -20 km/s cloud suggest that the -20 km/s cloud is not a usual dark cloud . Therefore, model (2) is more favorable than model (1). At present we know of no source of activity other than GL490 itself in the observed region. If the active event is solely ascribed to GL490, the implied time scale and the spatial extent (about 5 pc) are remarkably large compared to those of usual molecular outflow sources.

S106-IRS4: A STAR LOOSING MASS IN THE CENTRE OF A BIPOLAR NEBULA

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S106-IRS4 is the brightest near IR source associated with the S106 bipolar nebula. It is located exactly at the centre of the bipolar structure, inside the narrow gap of emission between the two radio lobes. It is also a weak radio source. An analysis of the near IR photometric measurements and of the radio fluxes suggests the presence of an ionized envelope produced by mass loss of the early type star which is responsible for the ionization of the nebula (Felli *et al.* 1984).

We present higher resolution 1.3 cm wavelength VLA observations that set an upper limit to the size of the radio envelope and FTS velocity resolved Brackett-α and -γ profiles (Felli *et al.* 1985).

The part of the envelope that is optically thick at 1.35 cm wavelength is smaller than 0".15 in diameter which corresponds to 90 AU at a 600 pc distance. The profiles of the Brackett-α and -γ lines are somewhat different with half power widths of 121±10 and 181±15 km s^{-1} respectively. The He I (2^1P - 2^1S) line is detected at the S106 nebula but not at IRS4. The He I line emission of the nebula indicates that the central star of IRS4 must have an effective temperature of about 35 000 K. A comparison of the wind model scenario presented by Felli *et al.* (1984) with the present data and the Paschen line and Paschen edge data of McGregor *et al.* 1984) shows that the model encounters difficulties when observables that require details of the velocity field and of the innermost regions of the flow are considered. Observations that should improve our understanding of the central regions of IRS4 are proposed. Preliminary results of 6-cm wavelength VLBI observations are also presented.