

A REMARKABLE BIPOLAR FLOW IN THE CENTER OF THE ρ OPHIUCHI CLOUD

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Using the IRAM 30-m telescope in August and December 1988, we have discovered the first molecular outflow in the central part (L1688) of the nearby ρ Ophiuchi dark cloud. This outflow, found in the $J = 2 - 1$ line of ^{12}CO near the cloud core A, is an extreme case, weak (outflow mass-loss rate $\approx 5 \times 10^{-8} M_{\odot} \text{yr}^{-1}$) and highly collimated (length to width ratio > 14), which explains why it has escaped previous detections with smaller telescopes. The high-velocity molecular gas is hot and optically thin, making the $J = 2 - 1$ line of $^{12}\text{CO} \approx 3-4$ times stronger than the $J = 1 - 0$ line. Unexpectedly, this outflow does not appear to be driven by any of the embedded near-IR sources known in this region previous deep VLA surveys of the cloud (André, Montmerle, and Feigelson, 1987; Stine *et al.*, 1988; André *et al.*, in prep.). The outflow exciting source is thus probably a very low-luminosity ($L < 0.1 L_{\odot}$) young stellar object. Using the 30-m equipped with the MPIFIR bolometer, we have very recently found (March 1989) that this object is the strongest continuum point source of L1688 at 1.3 mm. By analogy with L1551-IRS5 and HL Tau, the radio properties of this source suggest that it possesses a weak, possibly collimated, ionized wind and a relatively massive, cold circumstellar disk ($M_{\text{disk}} \approx 0.1 M_{\odot}$).

Outflow activity does not appear to be widespread within the highest density regions and/or around luminous near-IR sources and seems a rare phenomenon in the core of the ρ Oph cloud. The fact that only one outflow has been discovered so far in this region, rich in embedded IR sources, is at variance with the current ideas on low-mass star formation (e.g., Lada 1988 and references therein)

References

- André, Ph., Montmerle, T., and Feigelson, E.D.: 1987, A.J., 93, 1182.
- Lada, C.J.: 1988, in *Formation and Evolution of Low Mass Stars*, eds. A.K. Dupree and M.T.V.T. Lago, Kluwer Academic Publishers, p. 93.
- Stine, P.C., Feigelson, E.D., André, Ph., and Montmerle, T.: 1988, A.J., 96, 1394.