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

Ph. Andre¹, J. Martin-Pintado², D. Despois³ and T. Montmerle⁴

¹Institut d’Radio-Astronomie Millimétrique, Granada, Spain
²Centro Astronómico de Yebes, Spain
³Observatoire de Bordeaux, France
⁴C.E.A. Saclay, France

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 12CO near the cloud core A, is an extreme case, weak (outflow mass-loss rate \( \approx 5 \times 10^{-8} \, M_\odot yr^{-1} \)) 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 12CO \( \approx 3-4 \) 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 (Andre, Montmerle, and Feigelson, 1987; Stine et al., 1988; Andre et al., in prep.). The outflow exciting source is thus probably a very low-luminosity \((L < 0.1L_\odot)\) 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 \((M_{\text{disk}} \approx 0.1M_\odot)\).

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 which the current ideas on low-mass star formation (e.g., Lada 1988 and references therein)

References