Triggered Star Formation in a Turbulent ISM
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CONDOR observations of high mass star formation in Orion

N. H. Volgenau[1], M. C. Wiedner[1], G. Wieching[1], M. Emprechtinger[1], F. Bielau[1], U. U. Graf[1], C. E. Honingh[1], K. Jacobs[1], B. Vowinkel[1], R. Güsten[2], D. Rabanus[1], J. Stutzki[1] and F. Wyrowski[2]

[1]I. Physikalisches Institut, Universität zu Köln, 50937 Köln, Germany

[2]Max Planck Institut für Radioastronomie, 53121 Bonn, Germany

CONDOR, the **CO**, $\mathbf{N}^+$, **D**euterium **O**bservations **R**eceiver, is designed to make velocity-resolved observations of the CO, [NII], and p-H_2D^+ lines in the 1.4 THz (200-240 μm) atmospheric windows. CONDOR's first light observations were made with the APEX telescope in November 2005. The CONDOR beam on APEX (at $\nu = 1.5$ THz) was expected to consist of a $4.3''$ main beam and a $73''$ error beam; this beam structure was verified from scans of Mars. The pointing accuracy, also determined from Mars scans, was better than $7''$. The average atmospheric transmission during our Orion observations (elev$\sim 57°$) was 19 ± 4 % along the line-of-sight. A forward efficiency of $F_{eff} = 0.8$ was determined from sky dips, and observations of the Moon and Mars were used to couple the CONDOR beam to sources of different sizes ($\eta_c = 0.40$ and ~ 0.10, respectively). For more information, see Wiedner *et al.* 2006.

With CONDOR, we observed CO $J = 13 - 12$ emission from three sites of high-mass star formation in Orion (IRc2, FIR4, and NGC2024). A sample spectrum from Orion IRc2 is shown in Fig. 1. In our analysis of IRc2, we assume that all spectra from positions $< \pm 20''$ include a "spike" ($\Delta v \approx 5$ km s^{-1}) and a "hot core" component ($\Delta v \approx 35$ km s^{-1}). The optically thin spike emission arises from the interface of the Orion Ridge and the energizing M42 HII region. A simple isothermal model fit to the $J = 13-12$ and higher-J CO lines (e.g. Boreiko *et al.* 1989) reveals that the layer must indeed be warm ($T_{kin} \approx 620$ K), dense ($n(H_2) \approx 2 \times 10^6$ cm^{-3}), and thin ($N(CO) \approx 1.2 \times 10^{16}$ cm^{-2}). Because the Ridge has a temperature gradient, we are currently modeling the data using a PDR code. We are also analyzing the line wings to constrain the outflow properties.

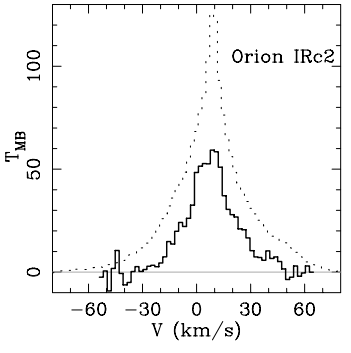

Fig. 1: CONDOR/APEX CO $J = 13-12$ (solid) and HHT CO $J = 7-6$ (dotted) spectra centered on Orion IRc2. The velocity resolution is smoothed to 2 km s^{-1}. Conversion to T_{MB} was made with $\eta_c = 0.40$ for the CONDOR data and $\eta_c = 0.54$ for the HHT data (Wilson *et al.* 2001). These coupling efficiencies are only valid for the extended, warm CO emission (the "spike" component); thus, the scale for the line wings (the "hot core" component) is underestimated.

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