SF2A 2006
D. Barret, F. Casoli, T. Contini, G. Lagache, A. Lecavelier, and L. Pagani (eds)

CHARACTERIZATION OF THE IRAS22129+7000 PROTOSTAR AND ASSOCIATED MOLECULAR OUTFLOW IN B175 (=L1219)

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Abstract. We present a multi–wavelength study of the cold and deeply embedded IRAS22129+7000 source and associated bipolar outflow, first detected by Nikolic & Kun (2004), near the Ced201 reflection nebula. We have detected and resolved the source that drives the extended molecular outflow at high angular resolution using the IRAC camera and IRS spectrometer on board Spitzer, and mapped the 1.2 mm dust continuum emission with the MAMBO bolometer (at the IRAM–30m telescope). We have also mapped the outflow in the CO J=3-2 line with the Caltech Submillimeter Observatory (CSO) and targeted some specific positions in $C^{18}O$, ^{13}CO and HCO^+ (with the IRAM-30m), and in CO, DCO^+ and HCN (with the CSO).

1 The IRAS22129+7000 source and associated outflow

As a part of the Spitzer's *SPECPDR* programme (Joblin et al. 2005), we have observed the Ced201 reflection nebula (Cesarsky et al. 2001), in the Barnard 175 cloud (Bally & Reipurth 2001), at high angular resolution using the IRAC camera (at 3.6, 4.5, 5.8 and 8.0 μm) and IRS spectrometer (from 20 to 38 μm), and mapped the 1.2 mm dust continuum emission with the IRAM–30m/MAMBO bolometer. In these observations we have detected and resolved the cold and deeply embedded source that drives the extended bipolar molecular outflow first detected by Nikolic & Kun (2004) in CO J=1-0. The IRAC/MAMBO source can be associated with the IRAS22129+7000 source. In this contribution we present a summary of our multi–wavelength study of the IRAC/MAMBO source and its associated molecular outflow. We have mapped the bipolar outflow in the CO J=3-2 line (a $7'$x$2'$ region) with the CSO and targeted some specific positions in the $C^{18}O$, ^{13}CO and HCO^+ J=1-0 lines (with the IRAM-30m telescope) and DCO^+, HCN J=3-2 (wih the CSO). The spectral energy distribution (SED) of the source has been built with our Spitzer/IRAM-30 data and complemented with IRAS and 2MASS archive data. The SED indicates that the low–luminosity source is a low–mass young stellar object (YSO), either a Class I or a late Class 0 protostar. Molecular line profiles from optically thick lines show a red-shifted-absorption asymmetry towards the YSO which may be associated with gas infall. However, the presence of an extended molecular outflow induces a complex velocity field in the whole region that also produces intrinsically complex line profiles. Detailed infall modeling is underway to check this hypothesis. Finally, a clear emission feature at $\sim$26 μm is detected only towards the innermost regions of the protostellar envelope.

JRG was supported by the french *Direction de la Recherche* and by a *Marie Curie Intra-European Individual Fellowship* within the 6th European Community Framework Programme, contract MEIF-CT-2005-515340.

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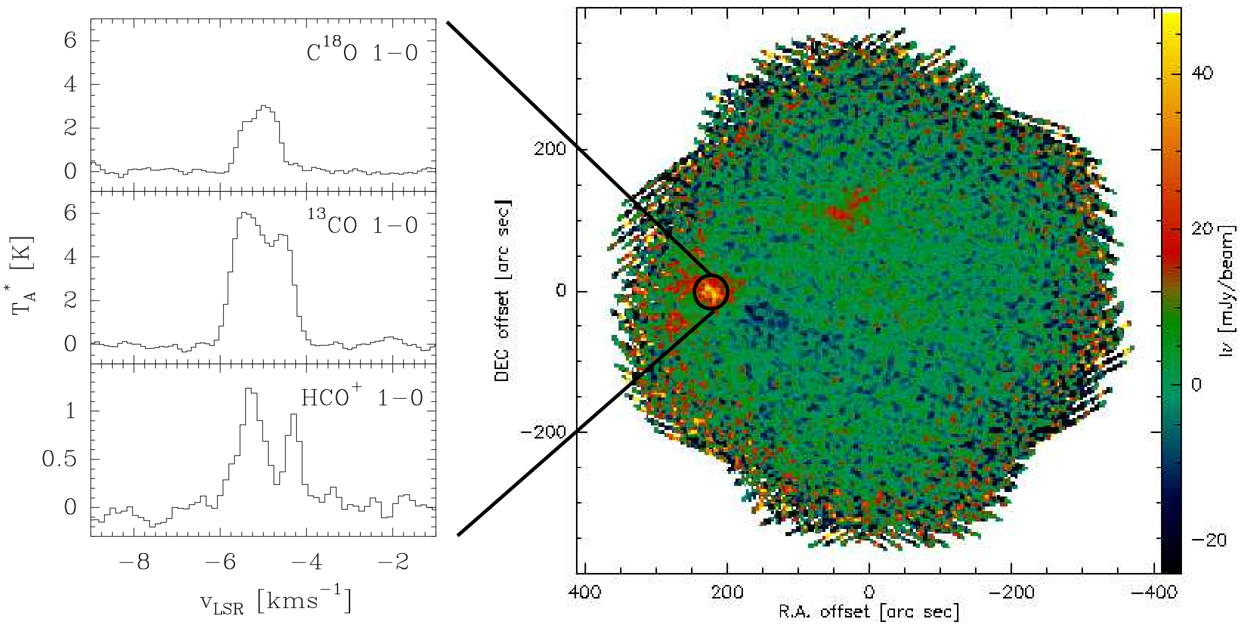

Fig. 1. *Right:* Preliminary map of the 1.2 mm dust continuum emission (observed with MAMBO/IRAM–30m) showing a clear detection of the IRAS22129+7000 source. Angular resolution is ∼11″. *Left:* Ground–state rotational lines of HCO^+, $C^{18}O$ and ^{13}CO (observed with IRAM/30m). Angular resolution ranges from ∼22 to 27″. Molecular lines of moderate optical depth show red–shifted-absorption asymmetries which may be the signature of infall motions.

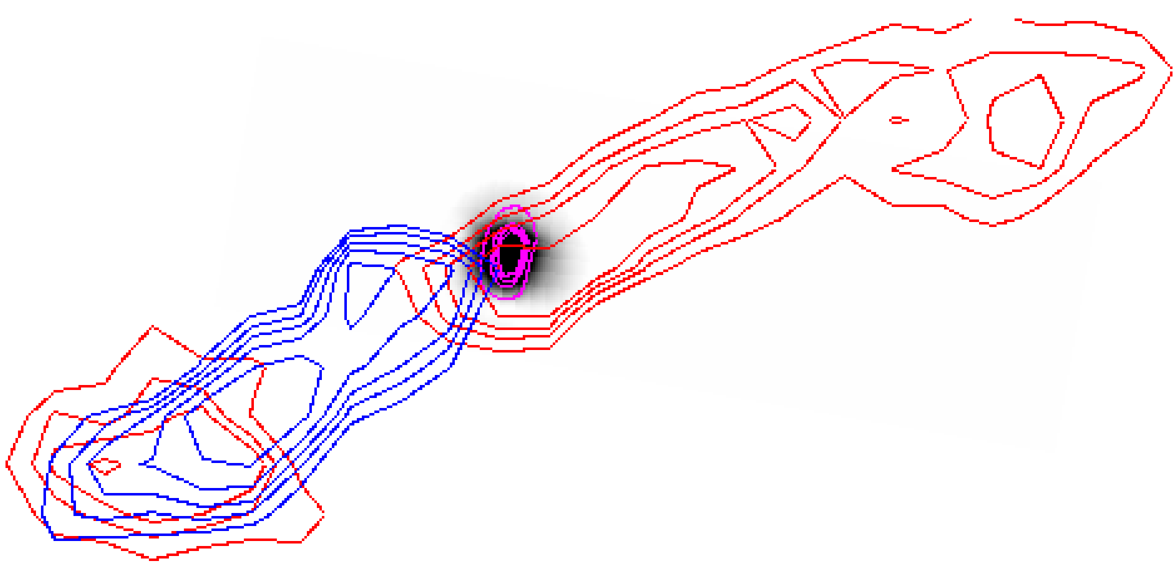

Fig. 2. Spitzer/Infrared Spectrograph (IRS) 26 μm map around the protostar (grey). Blue– and red– shifted CO J=3–2 velocity integrated emission contours (CSO) reveling an extended molecular outflow. The magenta contours represent the integrated intensity of the ∼26 μm emission feature detected in the IRS spectra only toward the central regions.