Bright CO clumps resulting from the interaction of the HD34078 runaway star with the diffuse IC405 nebula

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Some runaway stars are known to display IR arc-like structures around them, resulting from their interaction with surrounding interstellar material. The properties of these features as well as the processes involved in their formation are still poorly understood.

We obtained and analyzed a high spatial resolution map of the CO(1-0) emission that is centered on the runaway O star AEAur (HD34078), and that combines data from both the IRAM interferometer and 30m single-dish antenna. The line of sight towards HD34078 intersects the outer part of one of the detected globulettes, which accounts for both the properties of diffuse UV light observed in the field and the numerous molecular absorption lines detected in HD34078's spectra, including those from highly excited H2. These globulettes have a high density and linewidth, and are strongly pressure-confined or transient. (Gratier et al. 2014)

Wide-field imaging of this region with the IRAM-30m telescope reveals about 25 bright ($\sim$ 10K) and small ($< 22''$) CO clumps, while no CO emission is detected in the low angular resolution (>15') CO surveys (the classical Dame et al. (2001) and the latest Planck maps). The majority of these clumps are located on the parabolic interface that has been shaped by the star - ISM interaction. Measures of Halpha extinction combined with scattered blue light show that the bright CO clumps correspond to translucent gas with a typical extinction of Av$\sim$2–5. Most of these clumps have detected CN emission which favors quite dense gas (nH2 = 1e4-1e6 cm-3) for such an overall diffuse environment. We will present recent work resulting from on-going 5"-resolution, large mosaic (163 fields) observations with the PdBI. These observations should enable us to answer the questions concerning the origin and fate of these bright CO clumps, which exists while illuminated by an intense UV radiation field of HD34078 (χ = 100 − 10000 depending on the star-clump distance).