

P112c “Warm” Cores and Molecular Outflows in 70 μm Dark, High-Mass Clumps

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It is frequently believed that infrared dark clouds (IRDCs), specially those that are 70 μm dark, host the earliest stages of high-mass star formation. 70 μm dark IRDC clumps are usually assigned a status of prestellar. However, without sensitive interferometric observations is not possible to rule out deeply embedded star formation. Using a survey of prestellar, high-mass clump candidates at 1.3 mm carried out with ALMA at 1.2”, we have search for signs of star formation. Specifically, we have measured temperatures using H_2CO transitions and found the presence of “warm” cores of ~ 80 K, which are likely “hot” core precursors. To determine the temperature of cores, we have assumed local thermodynamic equilibrium (LTE) conditions. However, for the outflow emission, non-thermal conditions dominate. In addition to high temperatures, some cores show several emission lines of high upper energy levels (E_u), indicating the presence of high temperatures. Therefore, we find that some cores embedded in 70 μm dark IRDCs are already protostellar, but extremelly young because they are not yet detected in IR emission.