Probing the dust and gas evolution in starless cores

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Dust grains carry the budget of the cooling radiation and the knowledge of the grain properties is important to better understand the processes leading to star formation. In addition, grain surface chemistry plays an important role in the formation and freeze-out of molecules that are key to the chemical network. However, the expected evolution of dust properties such as grain sizes from the diffuse interstellar medium to dense cores is still an open issue.

Here, we present NIKA2 / 30m observations at 1mm and 2mm towards half a dozen of starless cores. We combine these data with MUSTANG-2 / GBT at 3mm and Herschel far-infrared maps as well as with the gas chemical composition as determined from the spectral line data obtained with the EMIR frontend at the 30m telescope in the framework of the large program on gas-phase elemental abundances in molecular clouds (GEMS) [1, 2]. The cores were selected from the GEMS sample and they are located in different environments, from low-mass to massive star forming regions, and they are at different evolutionary stages. The aim is to study the evolution of grain properties and their dependence on the environment. Here, we will present first results of this work.

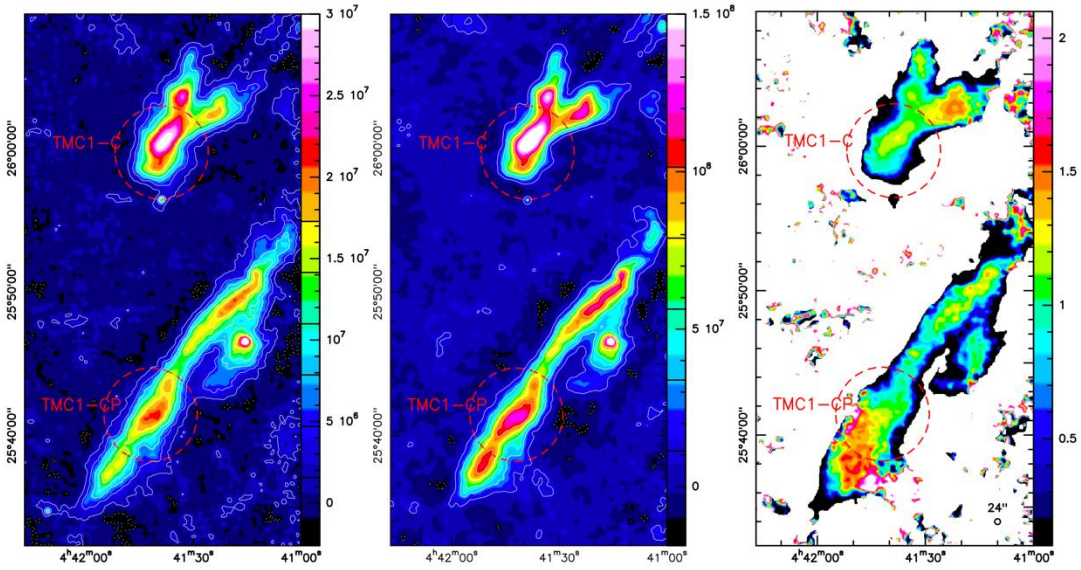

Figure 1 NIKA2 2mm (left) and 1mm (center) maps of two cores in Taurus with a map of the dust emissivity index (right).

References:

[1] Fuente et al., A&A, 624, 105 (2019)

[2] Rodriguez-Baras, Fuente et al., A&A, 648, 120 (2021)