

The physics of cold matter far from UV sources

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We will present two observational results opening two new perspectives on the Galactic ISM. (1) A recent analysis of the origin of the sub-millimetre Galactic dust emission measured by FIRAS points at a very cold ($T = 5 - 7$ K) emission component in the Galactic disk with an intensity independent of the longitude, (2) The detection of H_2 pure rotational lines up to $S(3)$ with ISO-SWS in a galactic line of sight avoiding star forming regions reveal traces of warm gas (about 1%) within the cold ISM.

Both results apply to matter far from UV sources. The former implies large amounts of cold dust, and therefore cold gas, in the outer galaxy. The latter implies H_2 excitation processes different from fluorescence such as collisional excitation in regions of enhanced dissipation of turbulence. Their link is the following: the cold gas in the outer Galaxy is likely to be molecular and too cold to be seen in emission except in the very localised regions where dissipation of turbulence is large enough to heat the gas up.

We will propose dust and gas observations which will determine the amount of matter traced by the very cold dust emission and which, with the help of modelling of turbulence dissipation, will further characterise the non-stellar energy sources of the warm gas emission.