A complete 3mm line survey of the B1-b and TMC-1 cores

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Spectral line surveys are the best tool to obtain a complete view of the molecular complexity of dense cores, where sun-like stars and planetary systems like ours will eventually form. We present the results of an IRAM 30m line survey at 3mm, recently extended to low frequencies, covering the full band between 71.6 - 117.6 GHz. Within the observed 46 GHz, we have identified 530 lines from 68 different molecular species in B1-b, and 420 transitions from 60 species in TMC-1. We have also detected several unidentified lines whose possible carriers are under investigation. The frequency range below 80 GHz has not been deeply explored, and unbiased line surveys provide a unique opportunity to detect new molecular species [1,2]. Figure 1 shows the different chemical characteristics of the two cores. While B1-b is abundant in deuterated, sulphurated, and complex organic species, TMC-1 is richer in hydrocarbons, cyanopolyynes, and other large carbon chains. They also represent different evolutionary stages towards star formation: while TMC-1 is a starless core, B1-b contains two very young protostellar objects with slow molecular outflows, small discs, and an incipient hot corino chemistry as seen at high angular resolution [3]. We will discuss the chemical inventory and obtained abundances, comparing the results of families of molecules and new detections in both sources, trying to understand their connection to the star formation activity and the cloud environment (carbon or oxygen rich, UV field, etc.).

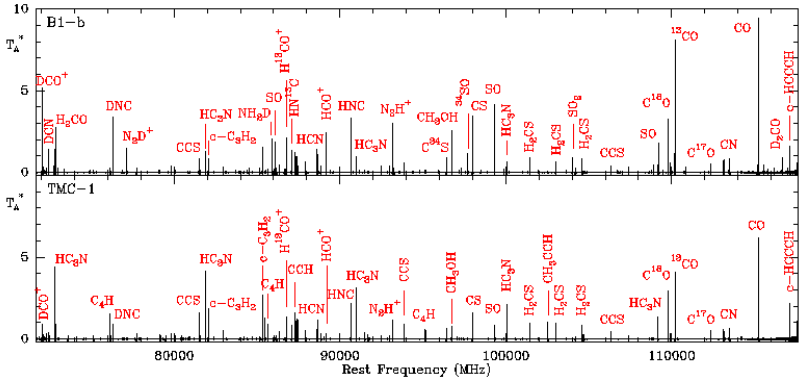

Figure 1. Obtained spectral scan at 3mm (71.6-117.6 GHz), towards B1-b (top panel) and TMC-1 (bottom panel).

References

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