

THE FAR INFRARED SPECTRA OF YOUNG STELLAR OBJECTS

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I will review the wealth of observations obtained with the spectrometers on board ISO towards Young Stellar Objects (YSOs). The focus will be on their line spectra, which are rich of several atomic and molecular lines.

I will briefly review what we learned from the FIR spectra of massive protostars, where molecular lines in the $\sim 2 - 20\mu m$ range are seen in absorption against the strong continua. Then I will discuss in more detail the FIR spectra of low mass protostars, which are dominated by emission lines, both atomic and molecular. Ionic and atomic lines mostly originate in the photodissociation regions (PDRs) either created by the YSOs or in which the YSOs are embedded. Molecular lines are emitted either in the disk/envelopes surrounding the protostars or in the shocks at the interface between the outflows emanating from the central objects and the surroundings. Emphasis will be given to the ISO H₂O detection towards shocked regions and towards the envelopes surrounding solar-type protostars.

Finally, ISO has permitted for the first time to observe the (expected) main oxygen bearing species in the gas around protostars and consequently to obtain the oxygen budget in those regions. I will discuss in detail the interplay between gas phase OI and H₂O during the first phases of the star formation, from the OI-rich cold pre-collapse phase to the H₂O-rich, yet not rich enough, collapse phase.