Feeding the young protoplanetary disk: cold gas flows to the young disks

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Stars and protoplanetary disks form out of collapsing cold and dense cores. In the earliest stages of star formation, the infalling protostellar envelope is still feeding the growing accretion disk. The paths of the infalling gas and dust determine the pristinity of the material that will be inherited by the protoplanetary disk [1, 2]. Passively heated protostellar envelopes tend to be too cold for CO gas to be an efficient tracer of the infalling velocity structure. Therefore, cold gas tracers such as DCO^+, N_2H^+, N_2D^+ and DCN reveal the infalling structure [3]. While hot molecular lines can trace the shocked gas on disk surfaces, cold gas lines trace the infalling flow that feeds into the cold outer part of young disks. These molecular lines were observed with ALMA toward two Class I protostars to unravel the kinematics in the vicinity of the young protoplanetary disks. I will present our results on the cold gas inventory and kinematics of these systems. The combination of radiative transfer and chemical models [3,4] are used to study the cold physico-chemical structure at the disk-envelope interface. These data will eventually reveal whether or not pristine material is inherited by the planet-forming disks.

References

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