Does gravity drive molecular cloud assembly?

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Star formation in galaxies is a complex process occurring across a vast range of scales, with molecular clouds playing a central role. However, the formation of these structures and the subsequent collapse of their gas into stars remain open questions. In particular, the role and relative importance of gravity on scales between the galactic disk scale height and prestellar cores are still debated.

In this talk, I present a case study of the mass assembly and evolution of a giant molecular cloud complex in a stratified-box numerical simulation of the interstellar medium, including photoionization and supernova driving.

By introducing tracer particles to accurately follow the forces acting on the gas during its evolution, both as it accretes onto and evolves within the clouds, we quantify the relative contributions of gas self-gravity and the gravitational potential of the stellar disk to the mass inflow.

We find that even in a highly turbulent environment, the mean motion of a small fraction of the gas is driven by gravity. However, this contribution is insufficient to significantly affect the overall mass inflow feeding the clouds.