The Role of Hierarchy in Galactic Molecular Clouds: Observational Tests of the Global Hierarchical Collapse

Kotora Sasaki, Nario Kuno, Hajime Fukushima, Shinji Fujita, Shingo Nozaki

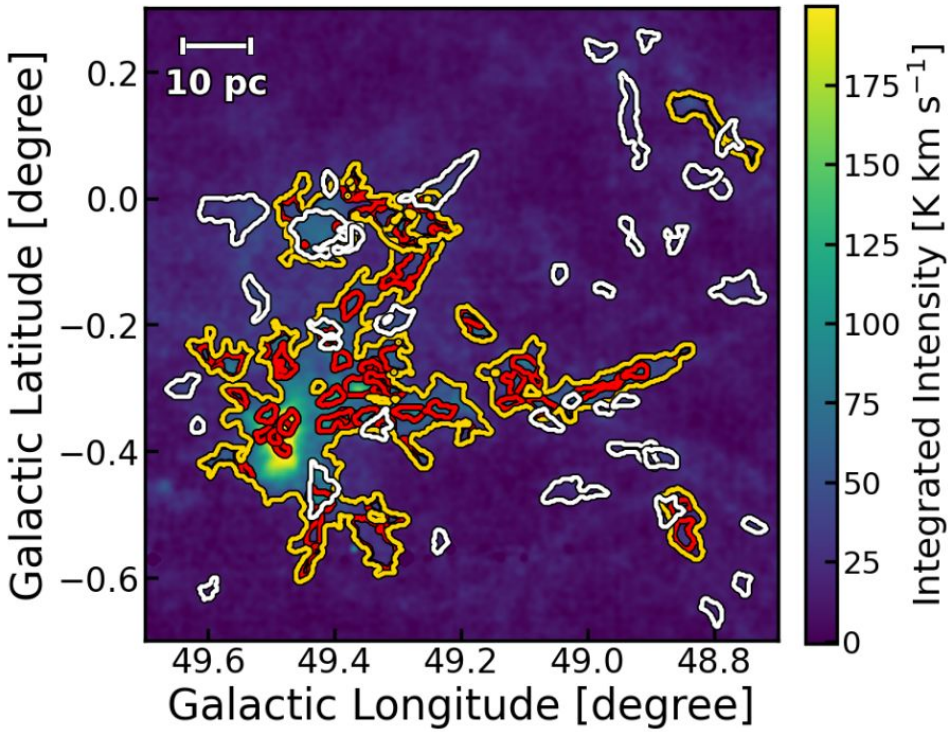
Massive stars form within multiscale gas structures, **but where is the gas reservoir for their mass set?**

> In the core itself?
> e.g., turbulent core
>
> In the structure hosting it?
> e.g., competitive accretion, GHC, conveyor belt

Tracing how structure changes across the hierarchy can give observational input on the two.

We apply a dendrogram to FUGIN ^{13}CO cubes of 13 Galactic star-forming regions, smoothed to a common ~1 pc resolution.

> Trunk — parent structure (yellow)
>
> Leaf — densest, inside a trunk (red)
>
> Isolated — no hierarchy (white)



Position-position diagrams of W51 A in ^{13}CO(1–0), overlaid with dendrogram structures

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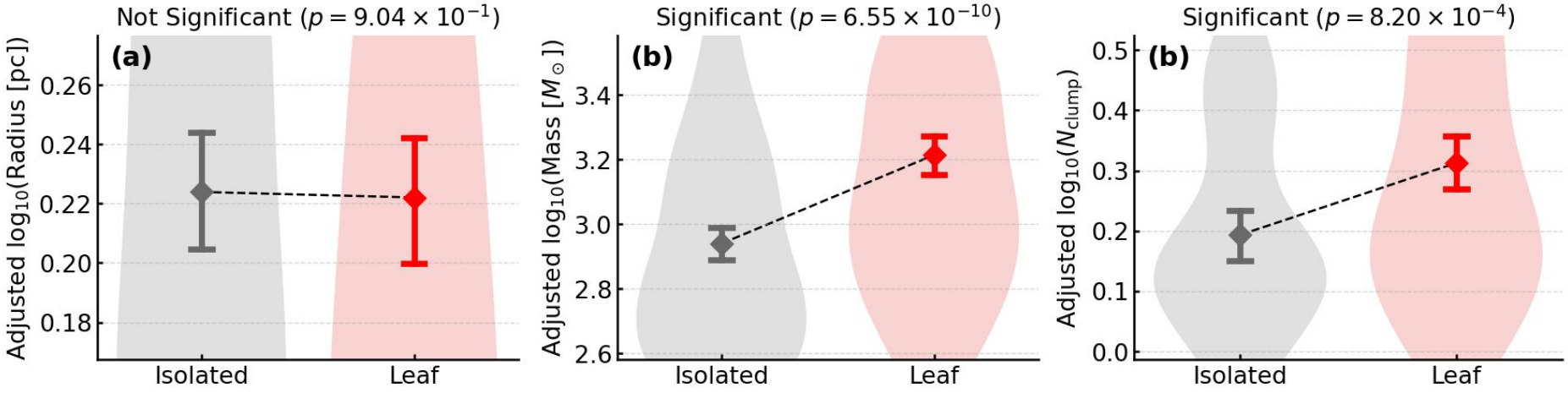

same size | more massive | more Hi-GAL clumps

Leaves and isolated structures share the same radius, but **the leaves are more massive and host more Hi-GAL clumps — the precursors of massive stars.**

Together these point to a reservoir set by the hierarchy rather than the local structure — the larger-scale pictures rather than the turbulent core.

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Full details at P.50