

Title: Identifying star-forming cores ^{13}CO emission maps

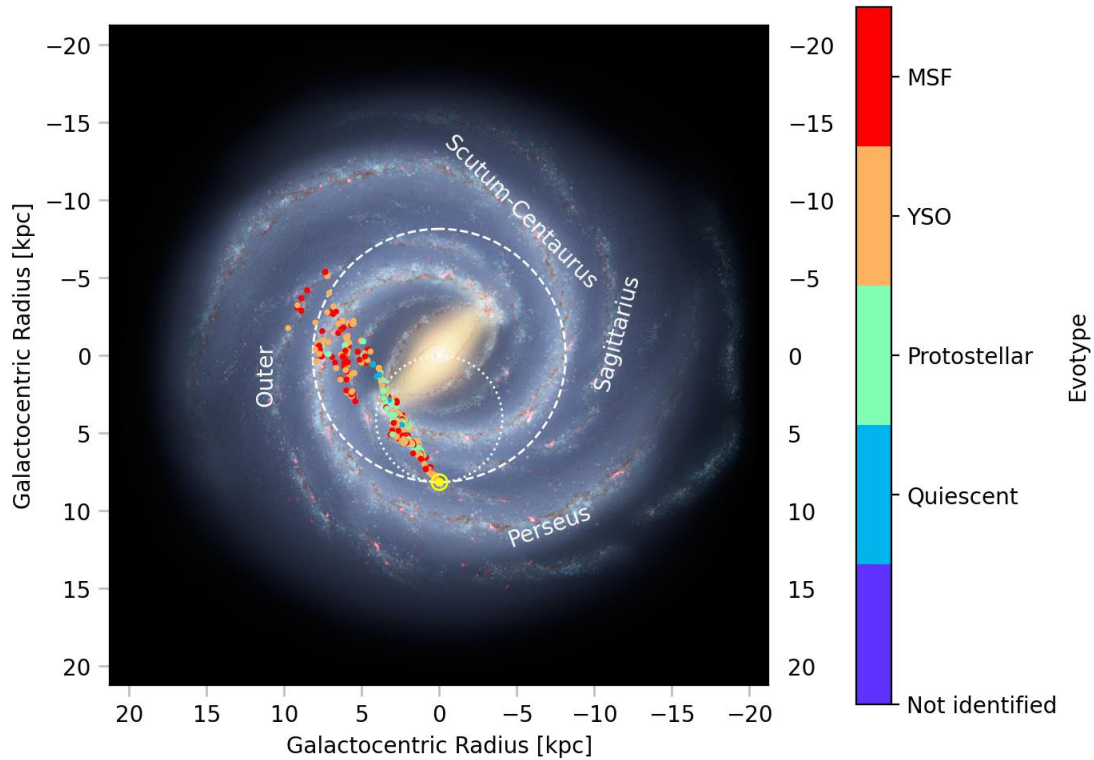
Sub-title: Evolution step of compact cores

In English:

Abstract:

Multi-tracer surveys have revealed the hierarchical nature of molecular clouds, showing how high-density, small-scale features are always nested within more rarefied, larger envelopes. This structural hierarchy is, however, a non-trivial one: at any scale, there appear to be more high-density and compact clumps than larger and less dense structures. The densest clumps in a cloud's hierarchy are compact cores, the site of star formation. This hierarchy can be encoded as a dendrogram representing the nested levels of the emission. We search the densest regions (the leaves of the dendrogram) of the ^{13}CO emission maps of the CO Heterodyne Inner Milky Way Plane Survey (CHIMPS) to identify star-forming clumps at different stages of their evolution. We match the CHIMPS leaves with the sources in the APEX Telescope Large Area Survey of the Galaxy. ATLASGAL provides a catalog of the physical properties and evolution stages of a large number of clumps covering the regions spanned by CHIMPS. Our study indicates that most leaves contain one single type of ATLASGAL source, with young stellar objects being by far the most common stage of evolution.

Although in general, the different Galactic environments do not seem to impact clump evolution, we find that most of the non-star-forming sources are collected within 5 kpc of the Galactic center. Further investigation is required to exclude observational biases.

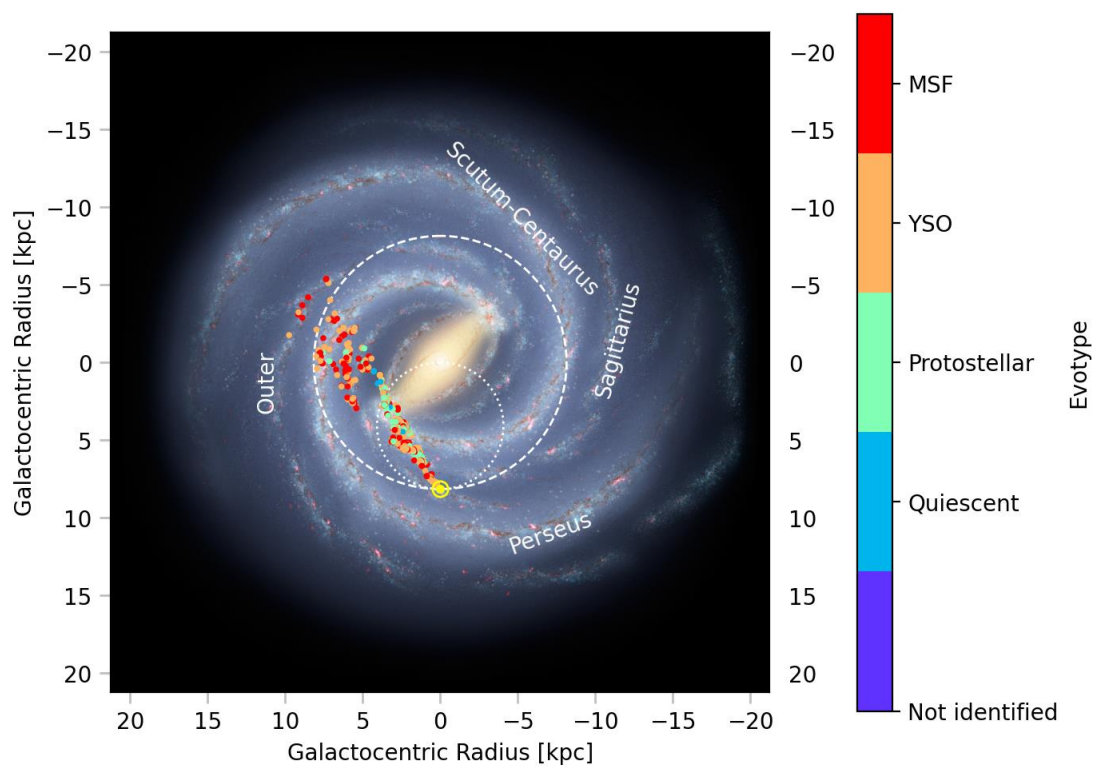


This figure shows the location of ATLASGAL source within a leaf by face on.

中文版:

摘要：

許多研究顯示分子雲的具有多重尺度結構，低密度的大尺度結構中會有較小的高密度結構(clumps)。然而，這種多重尺度結構是一個非常複雜的現象，在每個尺度的結構上，都存在更高密度的次級結構。分子雲的多重尺度結構可以利用樹狀圖(dendrogram)的方式來表達。我們利用 CO Heterodyne Inner Milky Way Plane Survey (CHIMPS)的 ^{13}CO 發射譜線影像的最高密度區域（即樹狀圖的葉子），以識別不同演化階段的高密度結構。我們將 CHIMPS 的中的葉子與 APEX Telescope Large Area Survey of the Galaxy. (ATLASGAL) 中觀測到的高密度結構進行配對。ATLASGAL 的目錄提供 CHIMPS 觀測區域中大量高密度結構的物理性質和演化階段的資料。我們的研究表明，大多數葉子中只包含一個演化階段類型的高密度結構，其中年輕恆星(Young stellar objects)是最常見的演化階段。不同的銀河環境與高密度結構的演化階段似乎沒有關連性，但我們發現大多數非恆星形成階段的高密度結構都集中在銀河中心附近 5 千秒差距內。需要進一步的研究以排除觀測偏差的影響。



這張圖展示跟 CHIMPS 的葉子配對的 ATLASGAL 不同演化階段的高密度結構在銀河盤面的分布情況。