We **detect 400+ Stage 0/I YSOs** in the giant molecular cloud **Sagittarius B2**, most of which are **resolved** and **optically thick**.

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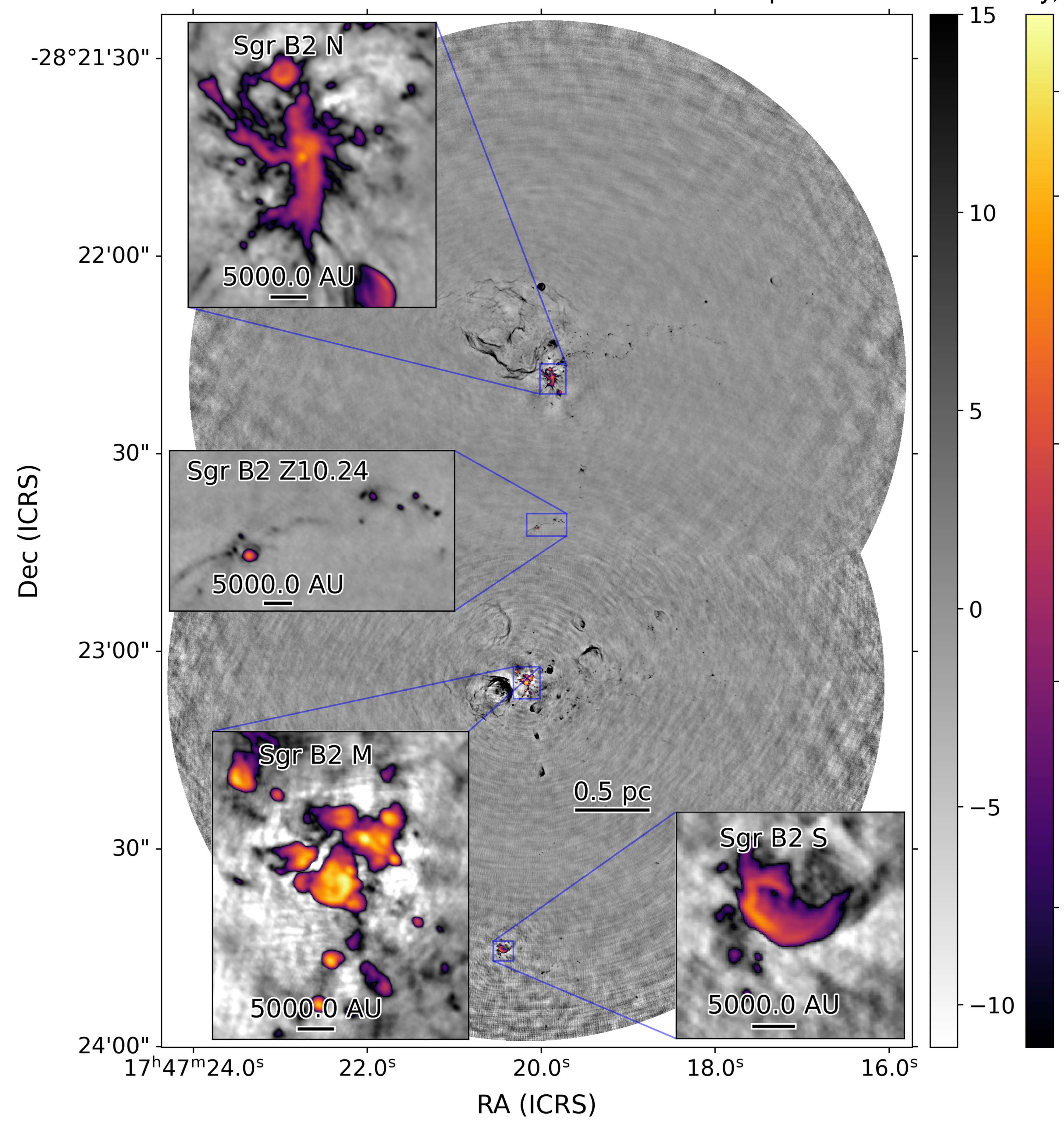
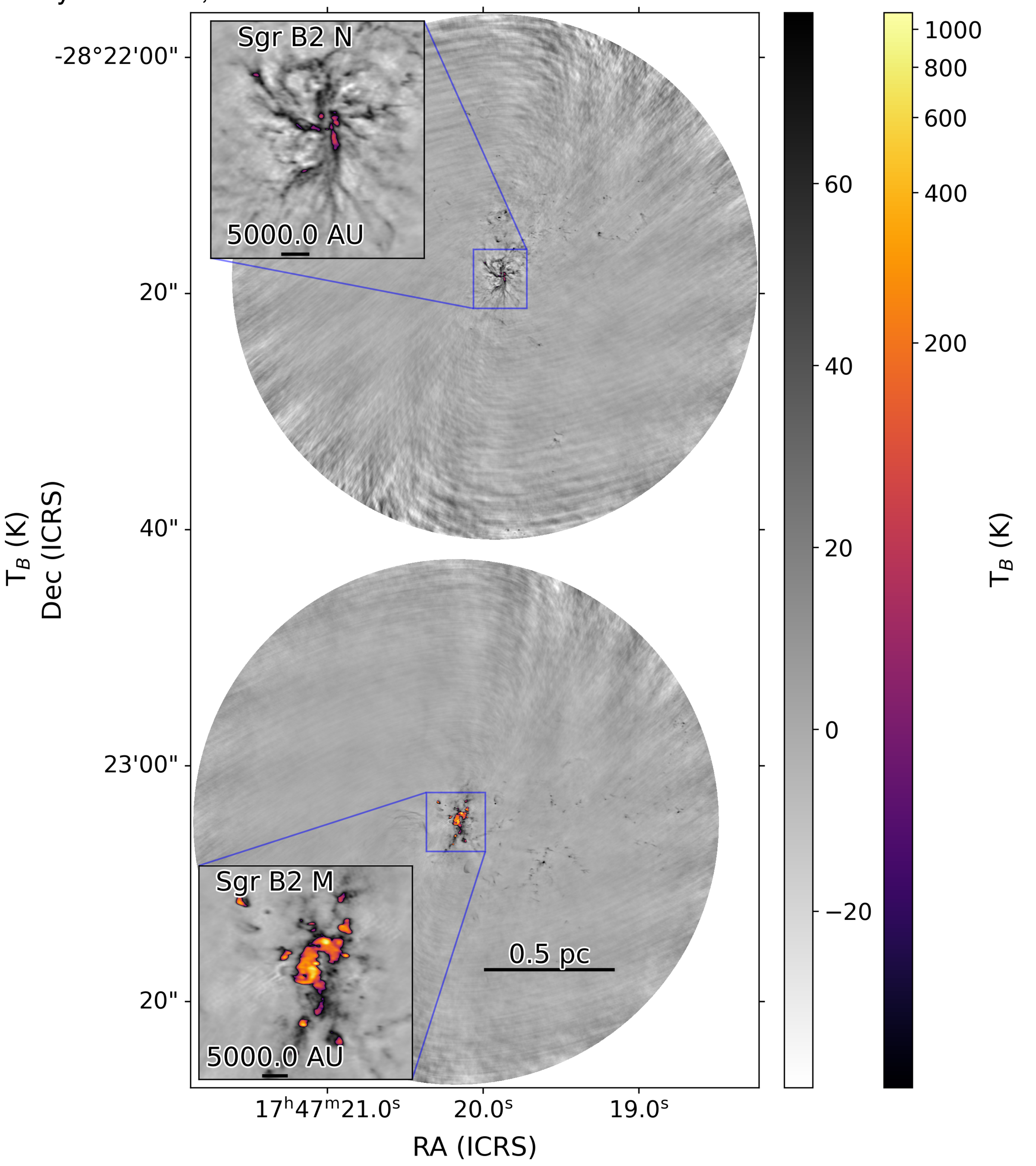


3 mm continuum image of Sagittarius B2 Main and North at **~700 AU resolution**. We detect 371 cores, whereas Ginsburg et al. (2018) detected ~150 sources in the same field of view with ~5000 AU resolution.



1.3 mm continuum image of Sagittarius B2 Main and North at **~500 AU resolution**. Sgr B2 M, where most sources are likely HII regions, appears to be hotter and denser than Sgr B2 N. Here, we detect 222 cores.

Summary:

We investigate protostellar cores in a molecular cloud that contains over 50% of star formation in the CMZ despite containing <10% of the mass and <1% of the volume – Sagittarius B2. With ~500 AU ALMA resolution, we find 371 compact sources at 3 mm and 222 in the smaller field of view at 1 mm. Most of the sources are marginally resolved and have a spectral index consistent with $2 < \alpha \lesssim 3$. We determine that our sample is comprised primarily of Stage 0/I YSOs that are warmer (T~50K) than in the rest of the Galaxy.

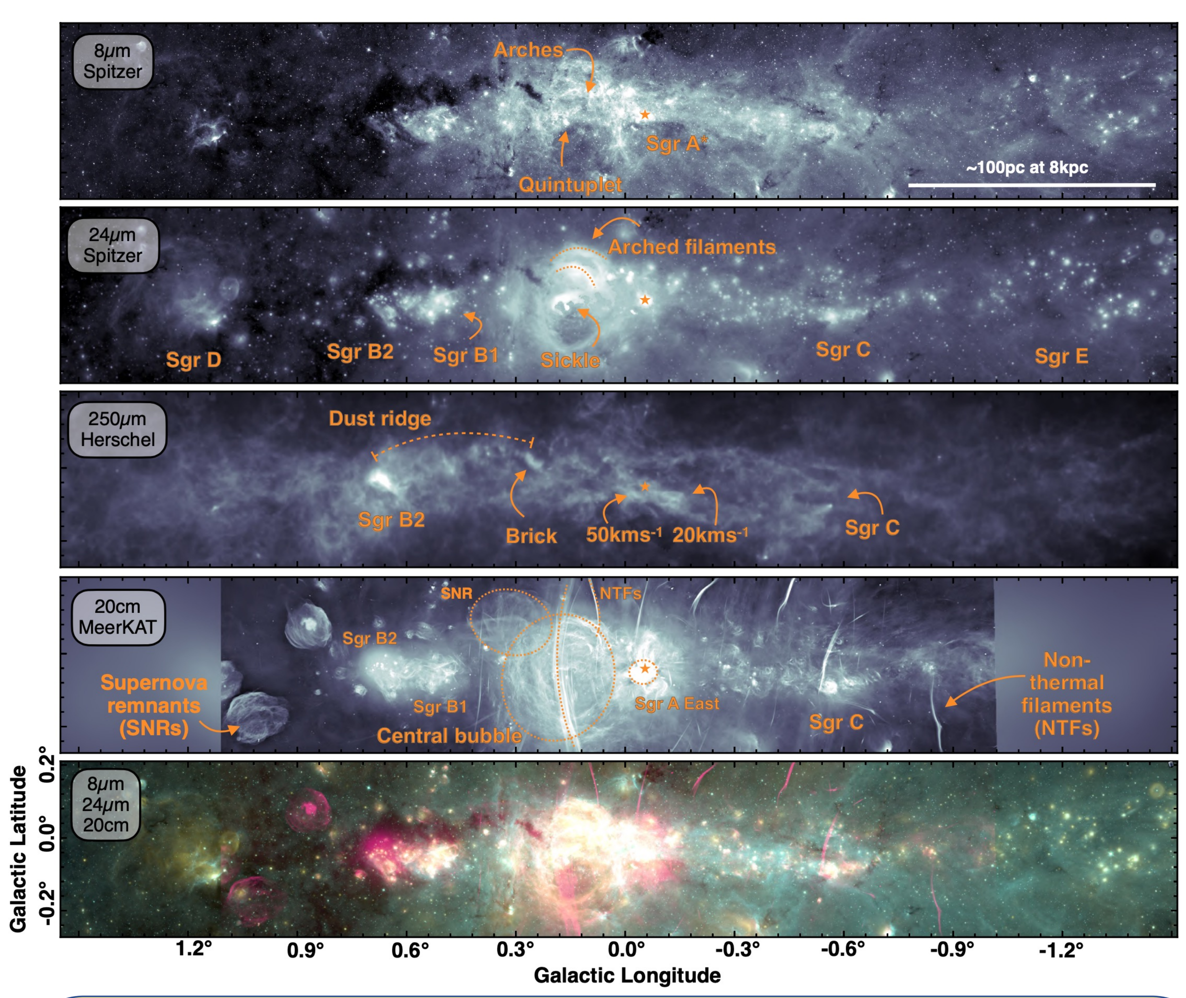
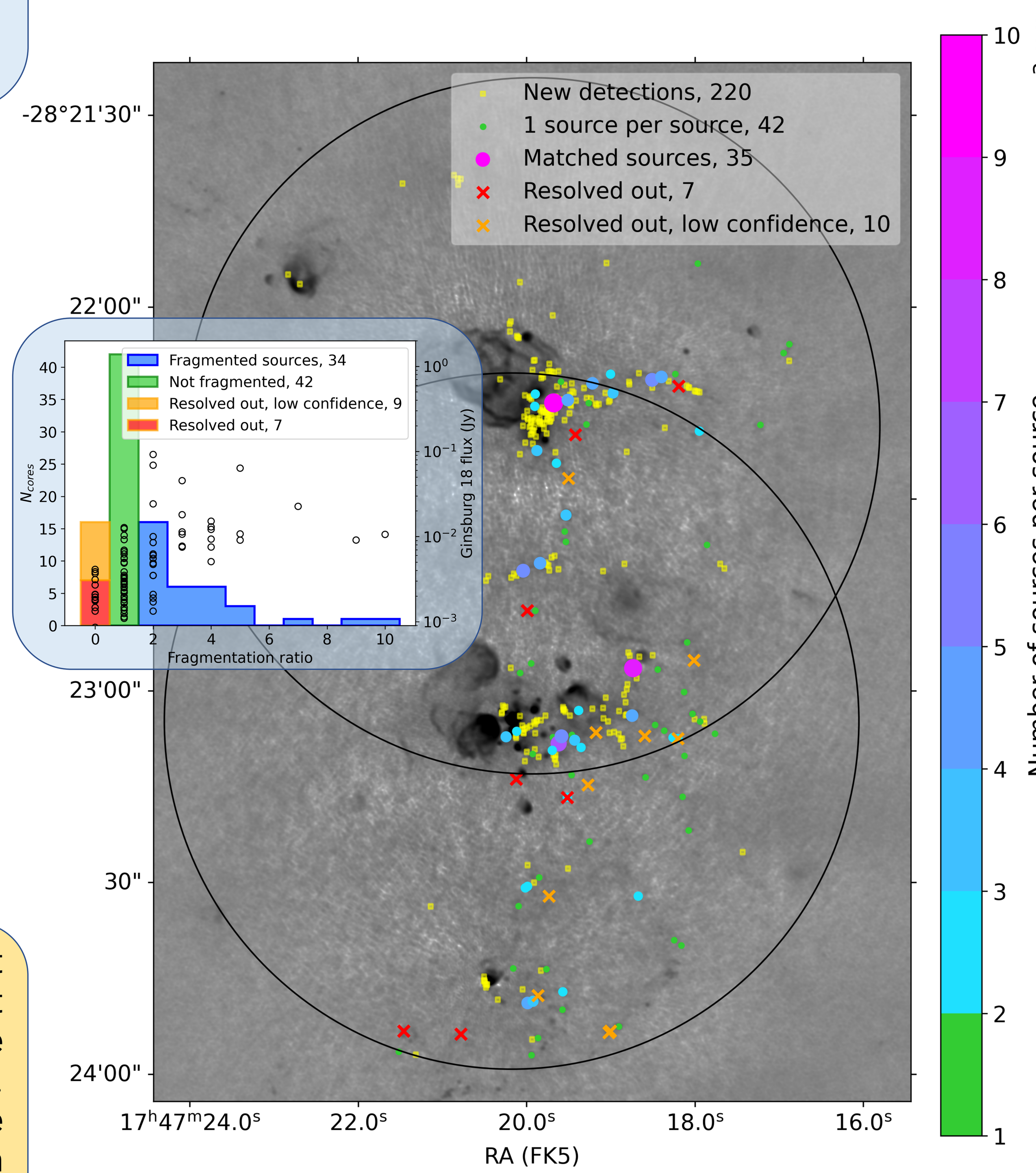


Figure from Henshaw et al. PPVII chapter 3. The environment in the Central Molecular Zone (CMZ) is similar to when most stars were formed (z~2). In young star clusters such as the Arches and Quintuplet, there is evidence of a **top-heavy IMF**. By peering into early stages of star formation in the CMZ we will investigate whether the **IMF varies** systematically with local environment and is thus shallower in the early universe.

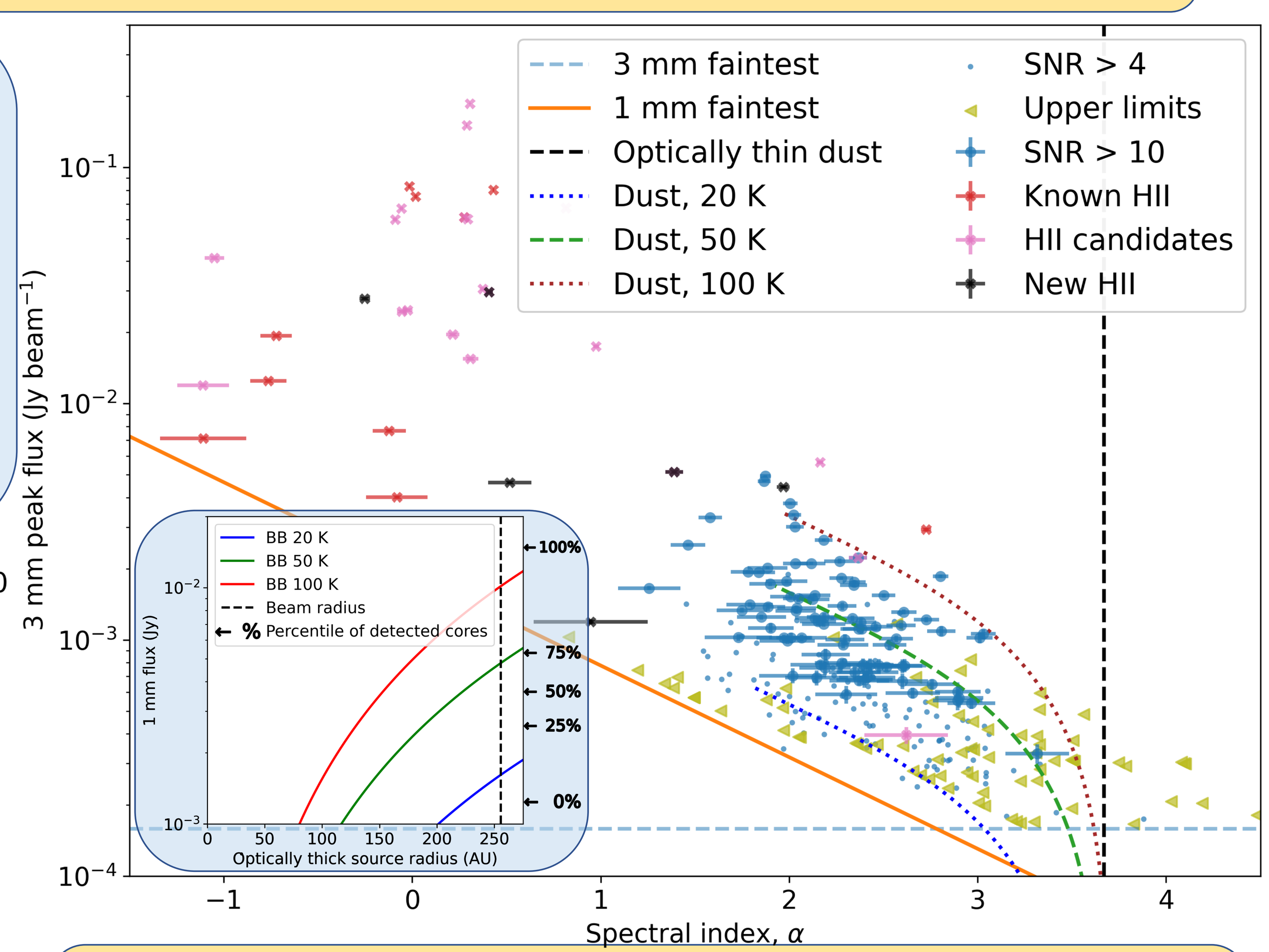
Results:

Using source counting, the most direct method, we infer the total stellar mass of 2300 $M_\odot$ for N and 6300 $M_\odot$ for M. For Sgr B2 M, the inferred stellar mass is lower than in all previous works. The resulting star formation rate is 0.0031 $M_\odot yr^{-1}$ for N and 0.0085 $M_\odot yr^{-1}$ for M, assuming the age of the cloud is 0.74 Myr.

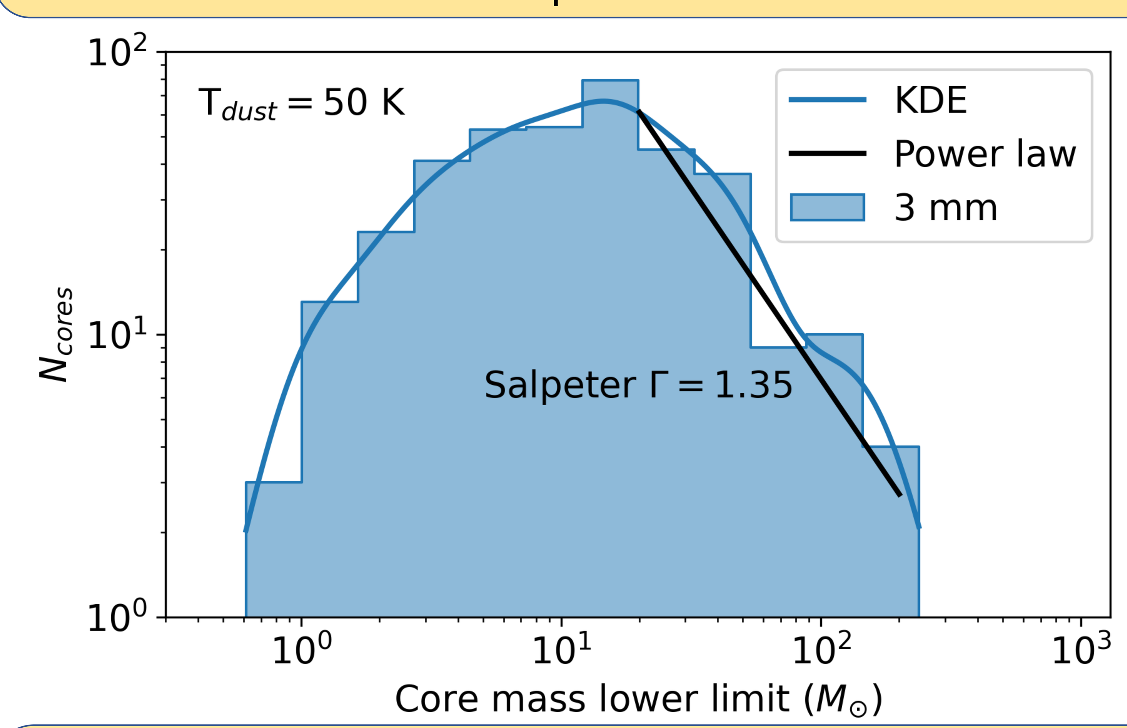


3 mm continuum image of Sgr B2 M and N with **~5000 AU resolution** (Ginsburg et al. 2018). On average, each G18 source fragments into 2 cores. Fragmenting massive cores into multiple lower-mass objects reduces the total expected luminosity.

Any G18 source brighter than 20 mJy fragments. What does this mean for the CMF → IMF mapping? Can we extrapolate this to other regions? See also: poster 06-0016 by Taehwa Yoo on core fragmentation in W51.



We cross-matched 1 mm and 3 mm detections to derive spectral indexes. Since most of our sources are spatially resolved, the spectral indexes based on the brightest pixel give information about the central part of the source.



The inferred **lower mass limit of the sources** using the **optically thin dust assumption** at 3 mm. The slope of the core mass function up to our completeness is ~1 compared to Salpeter IMF slope of 2.35. What could be causing the different shape? (T / star formation efficiency / binary function / accretion rate).

Future work:

- Sgr B2 H_2O maser catalog of with recent VLA data.
- Describe the kinematics of the cloud using the line data. Source clustering analysis.
- Measure proper motions of the cores with follow-up observations.

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Paper & website: bazarsen.github.io

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