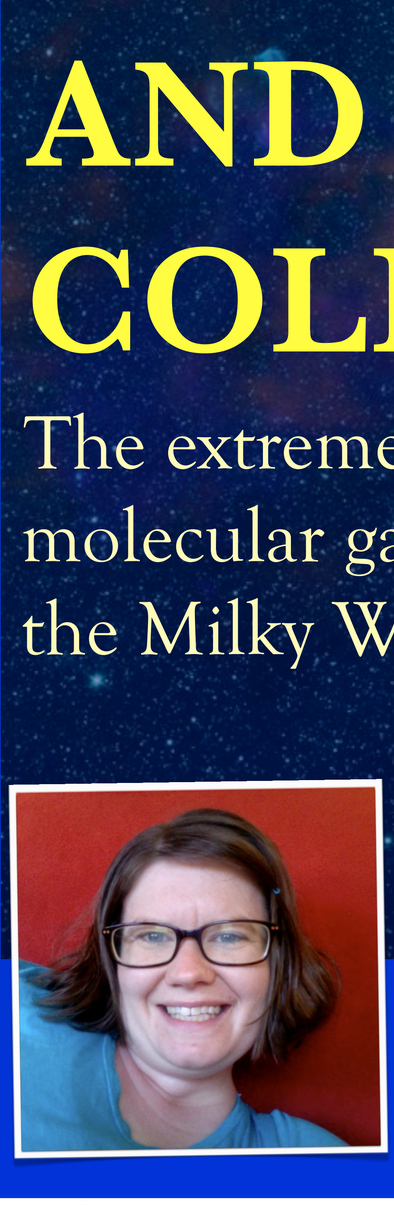
**RESULTS:** We study gas in the Brick, a **Galactic Center** molecular cloud, with the JVLA. We find the gas is still HOT (100-300 K) and TURBULENT (σ =5-7 km/s) on 0.1 pc scales, and exhibits multiple velocity components, with masers possibly indicating a collision. High temperatures, turbulence, and large-scale flows could all support gas against collapse, and explain the current lack of star formation.

# HOT GAS, MASERS, AND CLOUD COLLISIONS:

The extreme properties of molecular gas at the heart of the Milky Way Galaxy

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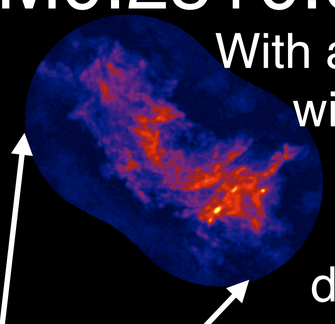
## M0.25+0.01 aka 'The Brick':



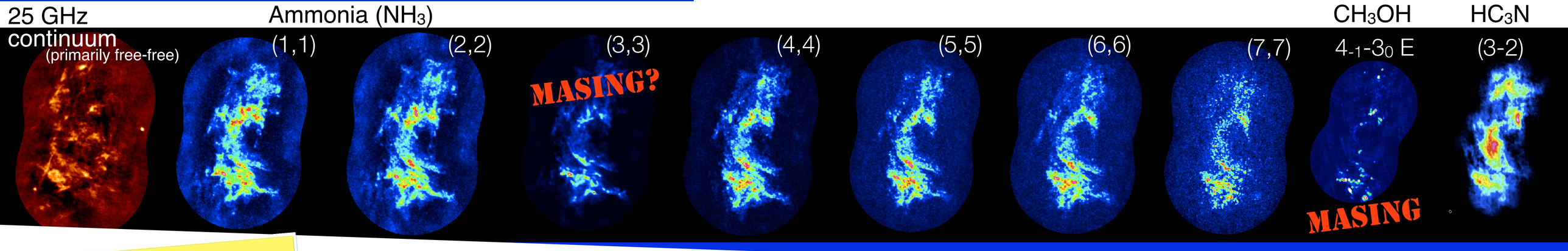
With a mass of $10^5$ $M_\odot$ concentrated within a size of 5 pc, this cloud is a candidate for forming a star cluster, but exhibits no detectable star formation. Why?

Gas in the central 200 parsecs vs. Galactic disk

| | | |
|---|---|---|
| Hotter: | T ~ 25 - 200 K | T ~ 5 - 20 K |
| Denser: | n ~ $10^4$ $cm^{-3}$ | n ~ $10^2$ $cm^{-3}$ |
| More turbulent: | σ ~ 20 - 50 km $s^{-1}$ | σ ~ 5 - 10 km $s^{-1}$ |

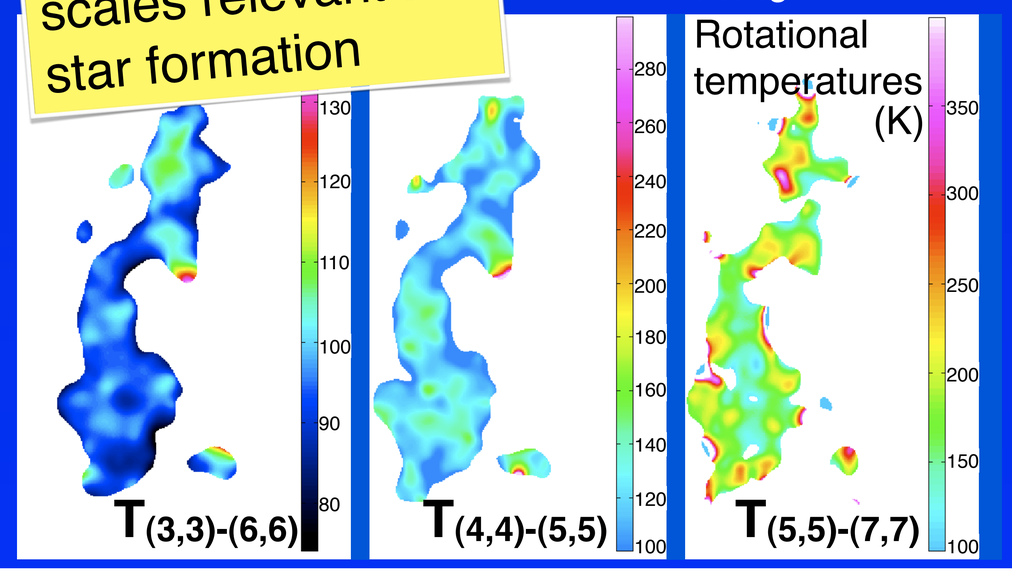
It is hypothesized that harsh Galactic center conditions lead to unusual star formation

Using the new **Karl G. Jansky VLA** capabilities, we study 6 Galactic center clouds, including the Brick with 2" (0.1 pc) resolution in sensitive 24-36 GHz continuum + molecular lines




**GOAL:** Determine conditions on small scales relevant to star formation

ARE GAS PROPERTIES STILL AS EXTREME ON 0.1 PC SCALES?

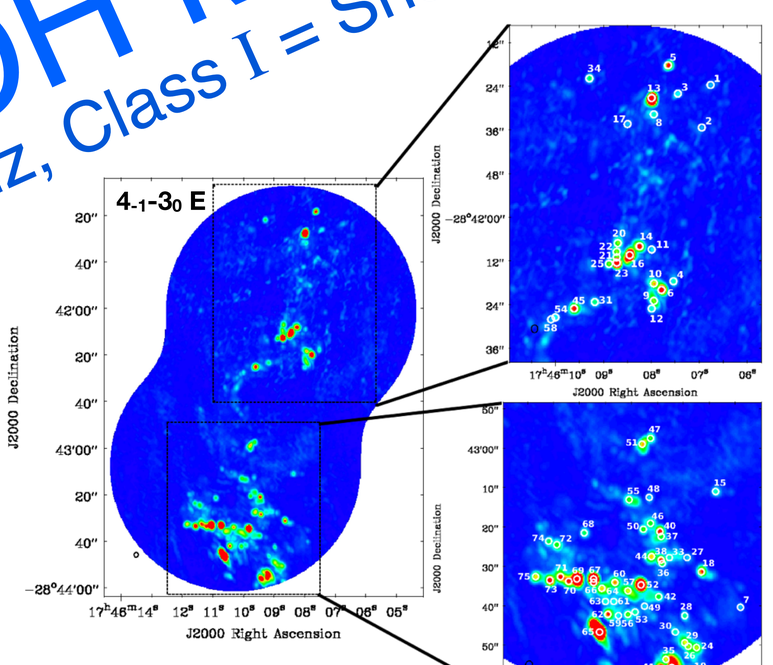



## TEMPERATURE

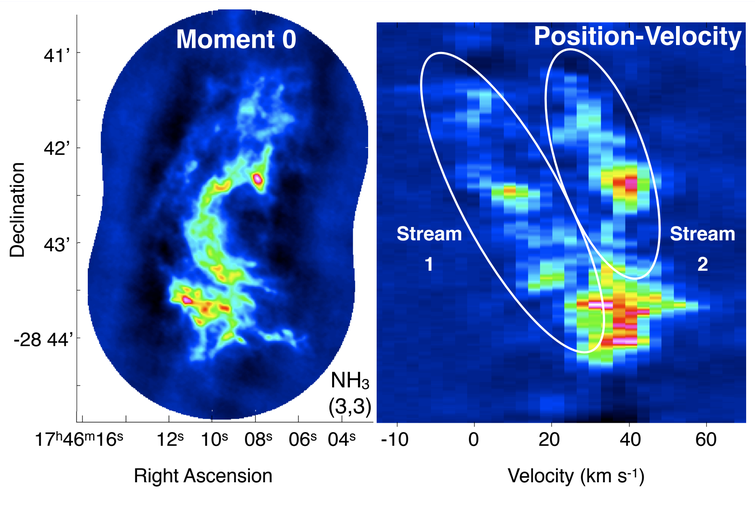
- Morphology in all $NH_3$ lines nearly identical
- Multiple temperature components coexist
- Clump temperatures 25-300 K
- **Mills et al. 2013** also find 400 K component with GBT

## $CH_3OH$ MASERS

36.1 GHz, Class I = Shock-excited




## TURBULENCE




- 80 km/s velocity gradient across cloud
- $\sigma_{FWHM}$ on 0.1 pc scales only 5-7 km/s
- 2 velocity streams intersect @ 40 km/s
- 2/3 of maser candidates located @ intersection
- Shock-excited masers trace cloud collision?