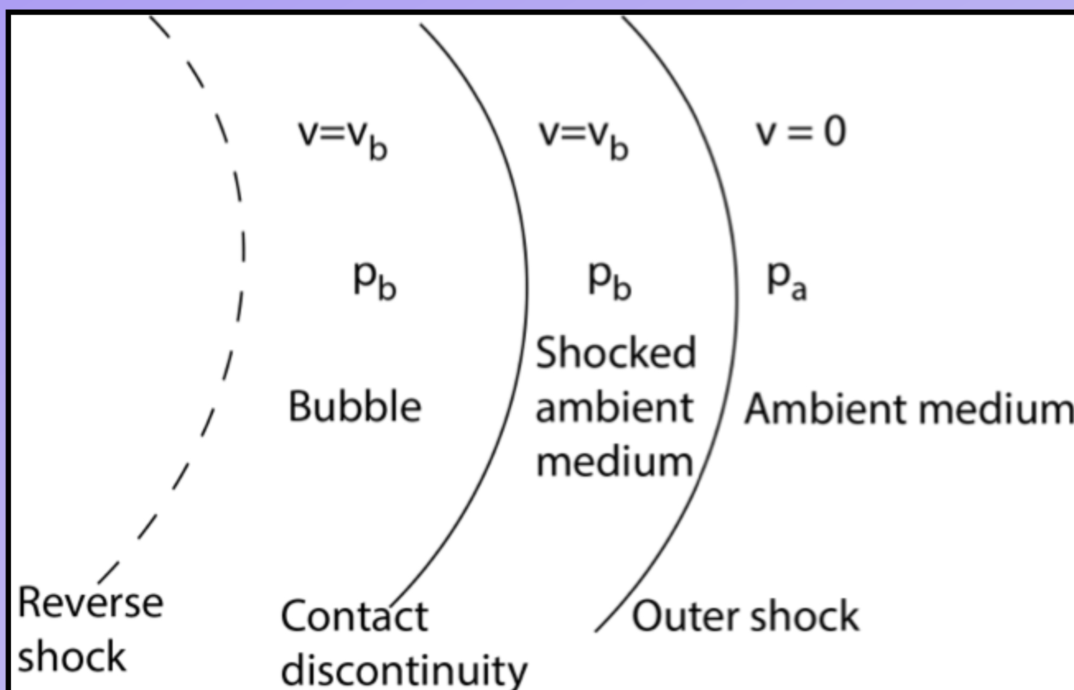
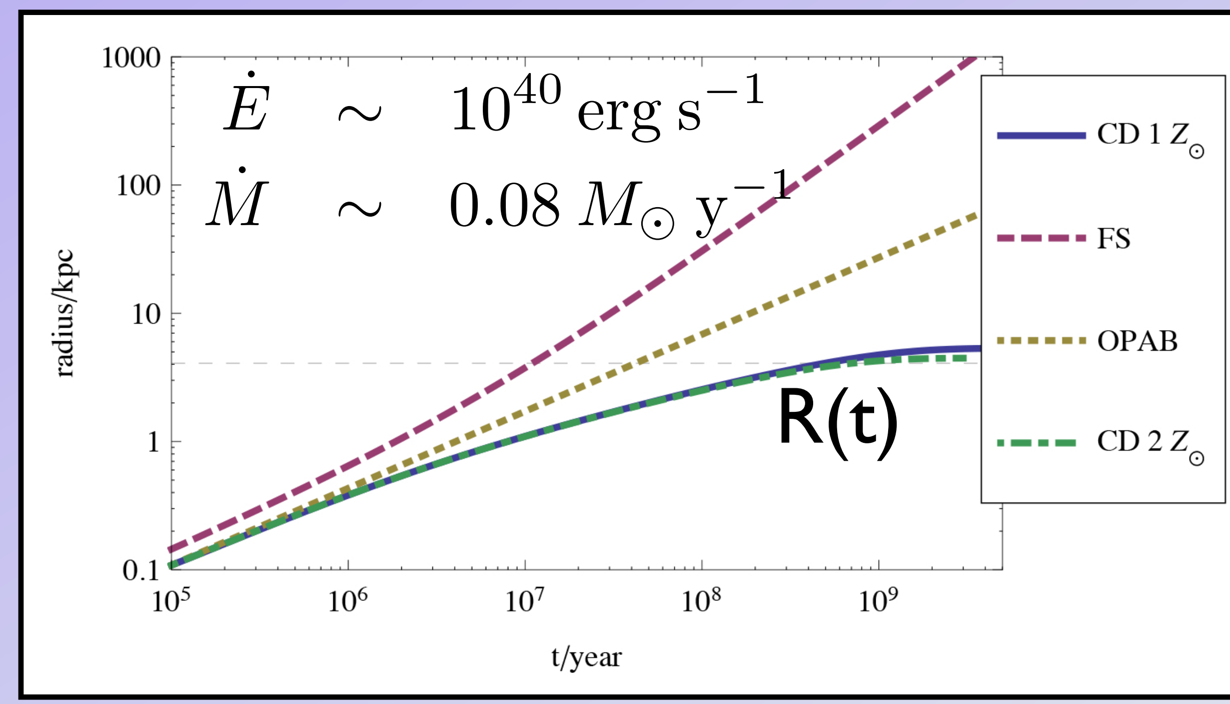
Poster Pop Session

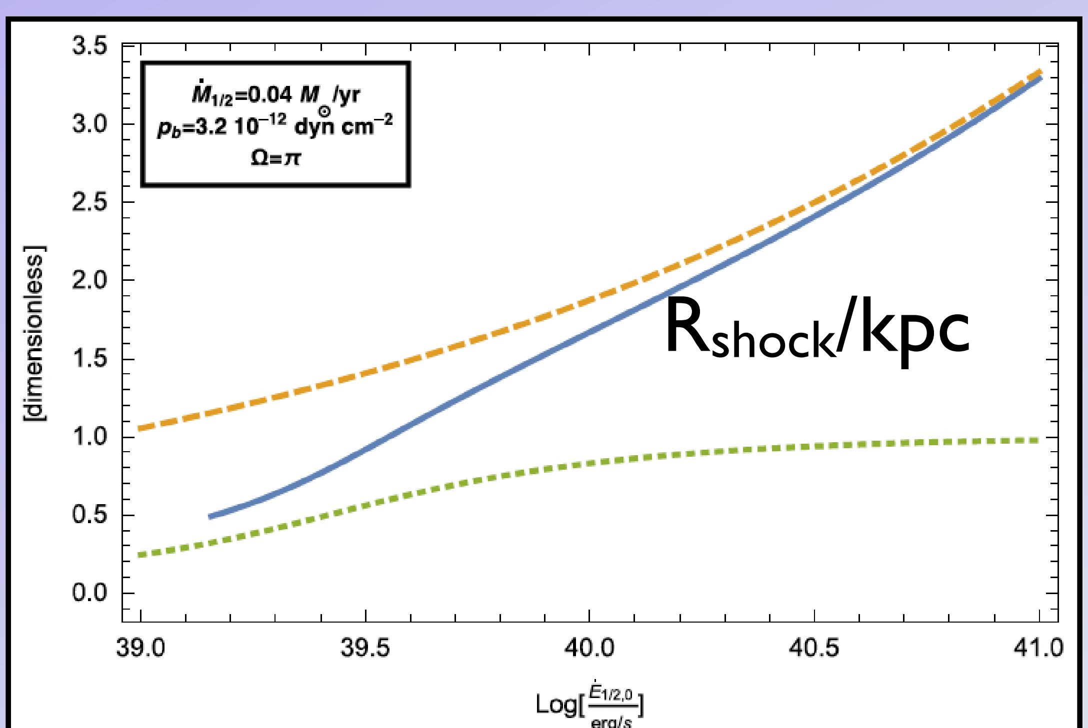
Crocker, Bicknell, Taylor & Carretti
Star formation-driven Fermi bubbles

Schematic of bubble



Radius as function of time

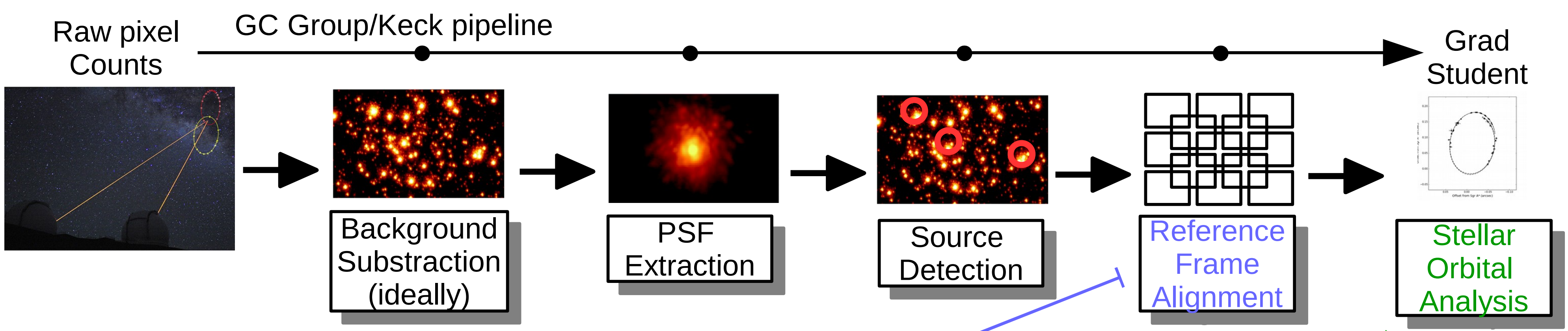




- Bubble ~10^8 yrs old
- Reverse shock @ 1-1.5 kpc in expanding bubble - origin of microwave haze and extended radio emission
- Hadronic gamma ray emission from shell inside bubble

Statistical Challenges in Fitting Stellar Orbits Around the BH at the Galactic Center.

Gregory Martinez[1], Kelly Kosmo[1], Aurelien Hees[1], Joseph Ahn[1] and Andrea Ghez[1]
[1]University of California, Los Angeles



- We have over 20 years of stellar data but our measurements are limited by the precision of our reference frame.
- Currently We estimate our reference errors by Jack Knifing. But, global likelihood analysis is on the way!

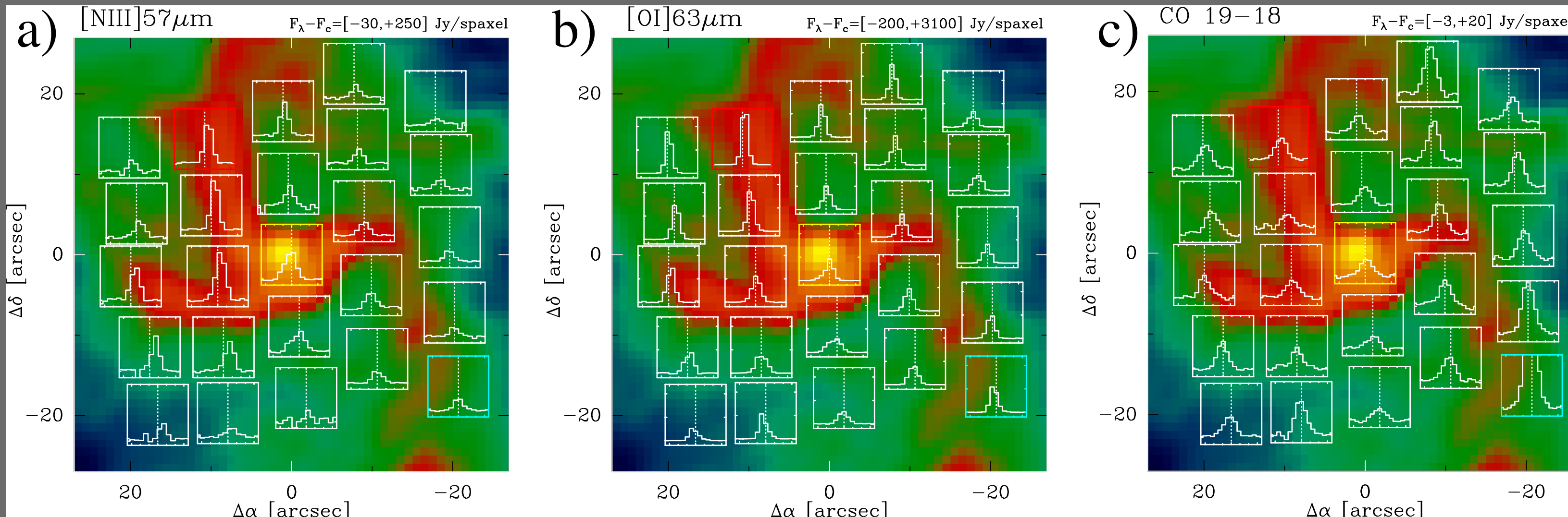
- Stellar orbital analysis presents interesting statistical challenges such as exploring large dimension parameter spaces and testing for statistical consistency.
- My poster details coverage tests of BH parameter's confidence intervels assuming various priors, include our “observational-based” priors.

Herschel far-IR & submm spectroscopy of Sgr A* and the CND

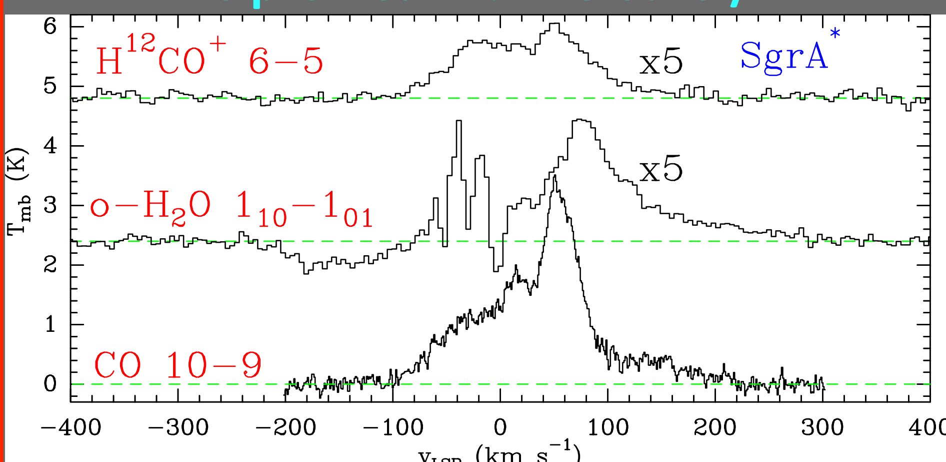
Javier R. Goicoechea[1,*] Mireya Etxaluze[1,2] José Cernicharo[1] Jerome Pety[3] and collaborators

[1]Grupo de Astrofísica Molecular, ICMM-CSIC, Madrid, Spain. [2]RAL, Oxford, UK. [3]IRAM-Grenoble, France

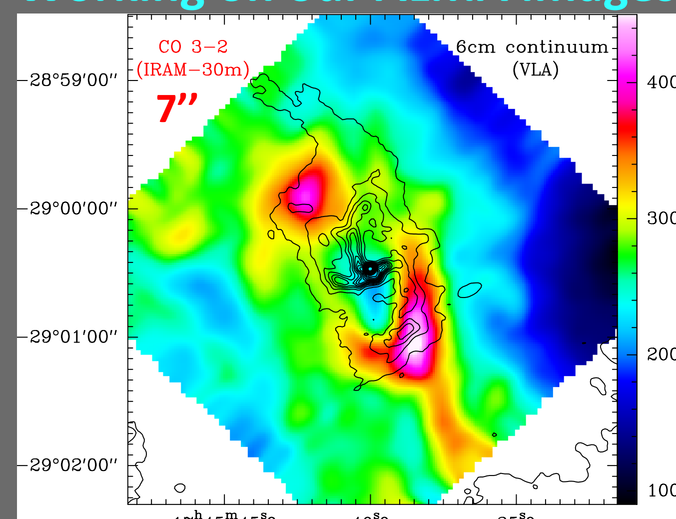
Distribution of ionized, neutral atomic, warm molecular gas with *Herschel*/PACS



Line profiles with *Herschel*/HIFI



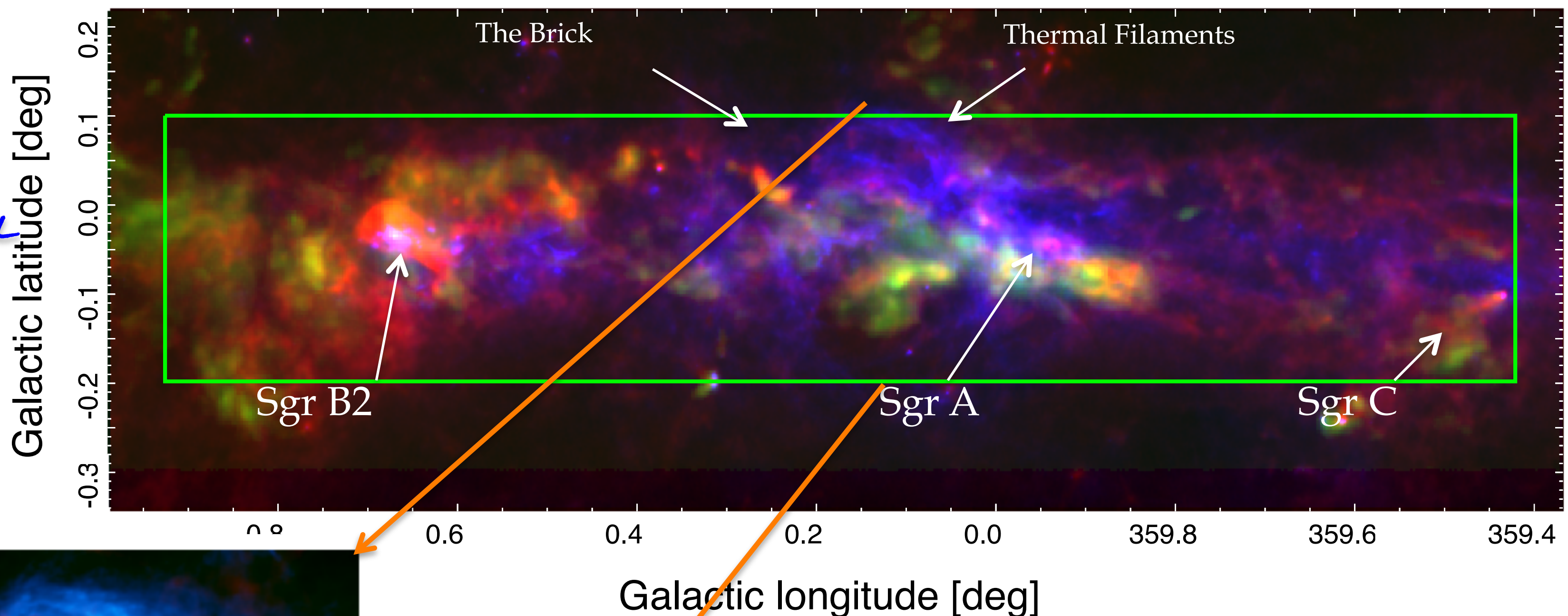
Working on our ALMA images…

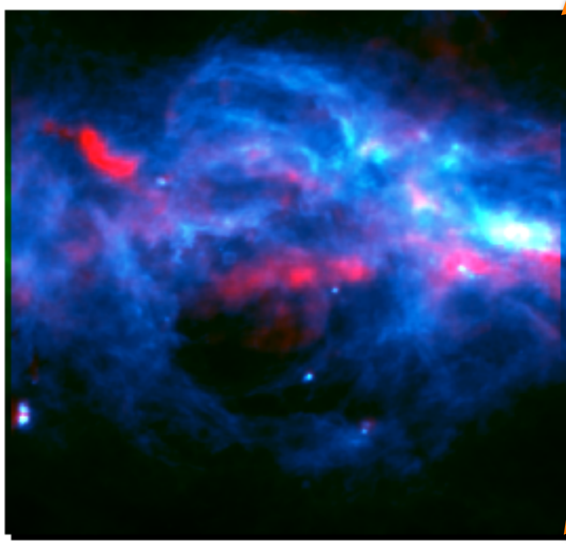


The Bubble in the Galactic Center

M. A. Requena Torres; A. Noriega-Crespo; A. Harris

PACS/HERSCHEL
LABOCA/APEX
HCN /Mopra

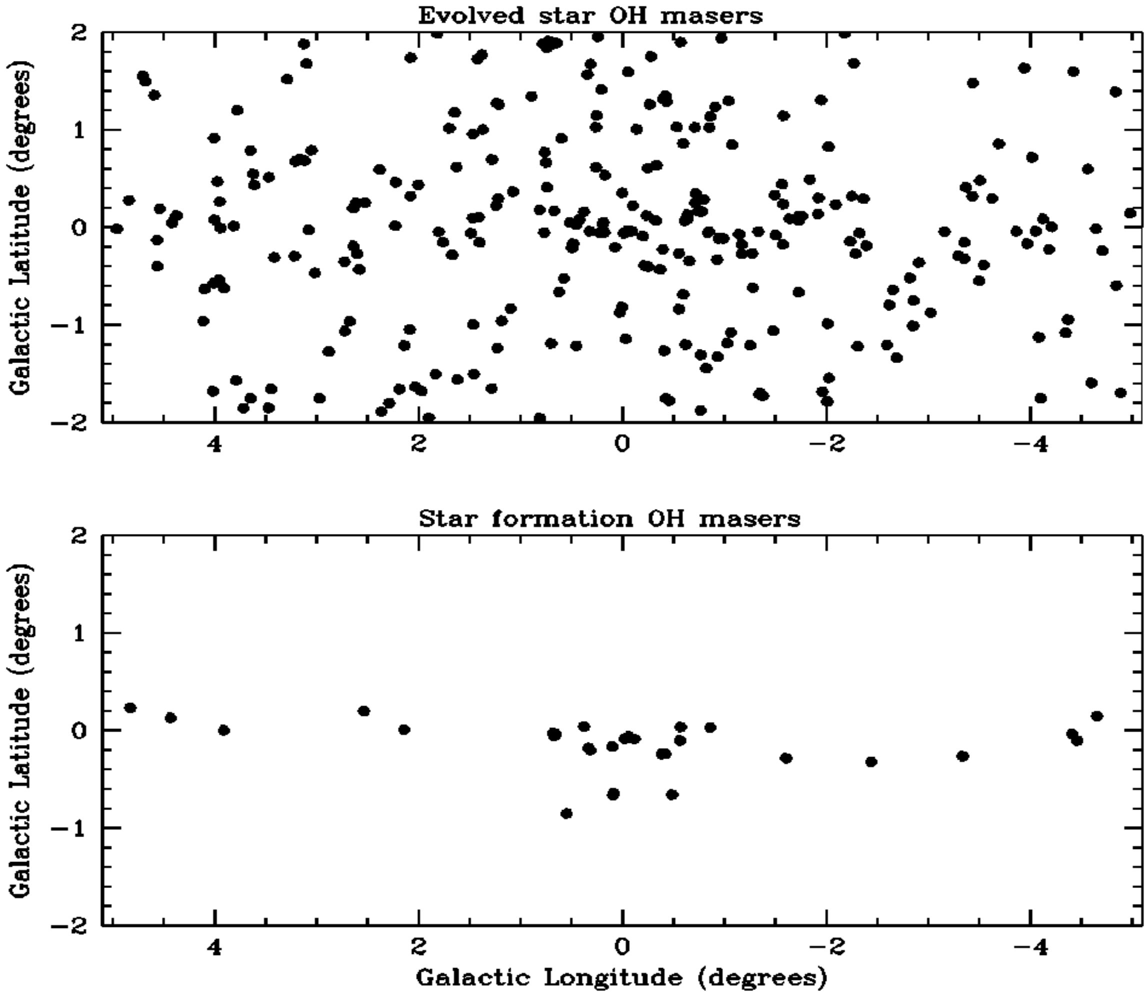




Work in progress

We try to compare the neutral molecular gas, ionized molecular gas and dust emission in the bubble of the Galactic Center. We use as starting point the data observed with *Herschel*.

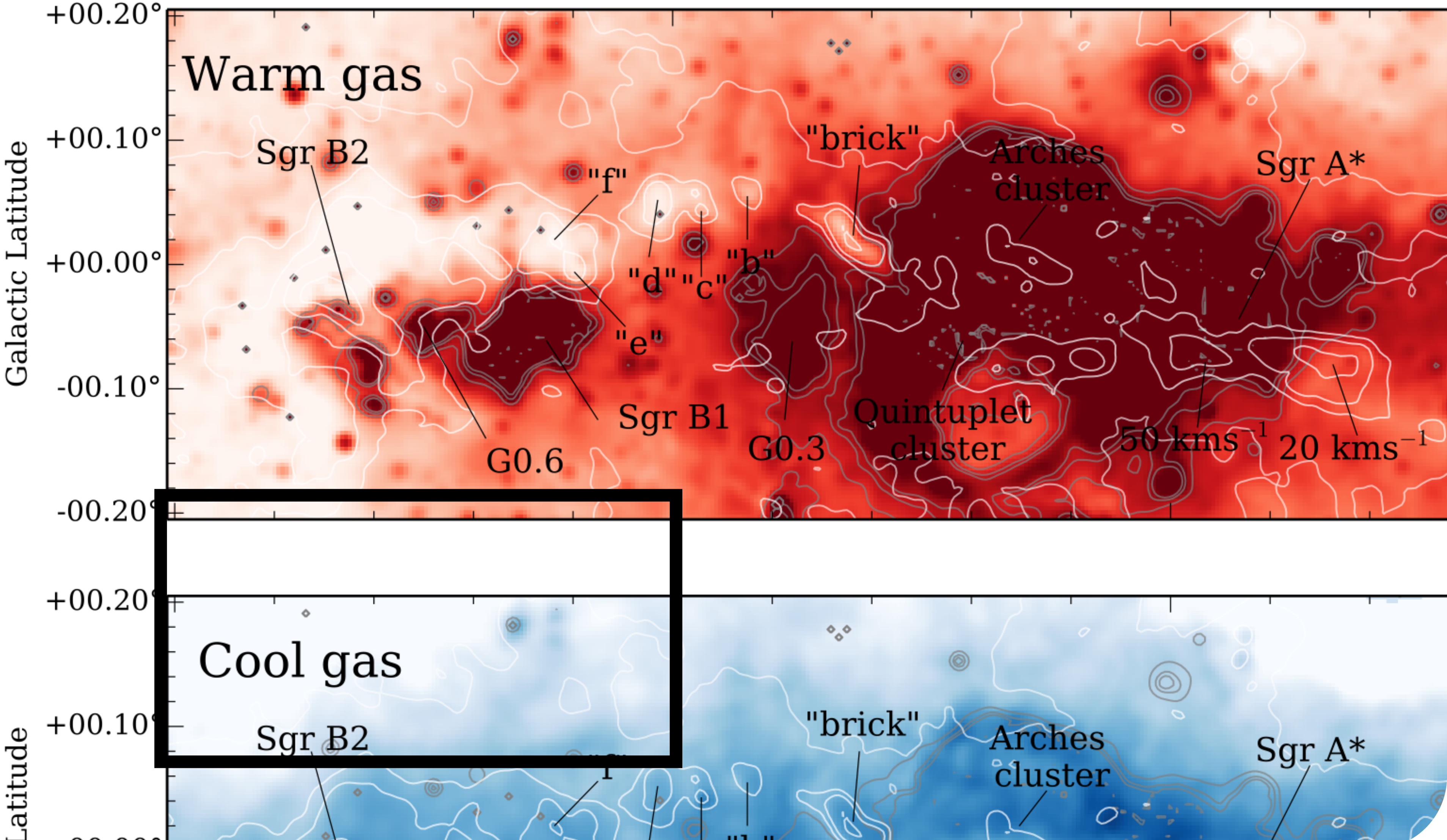
SPLASH OH masers in the Galactic Centre region



The OH maser distribution in the Galactic Centre region.

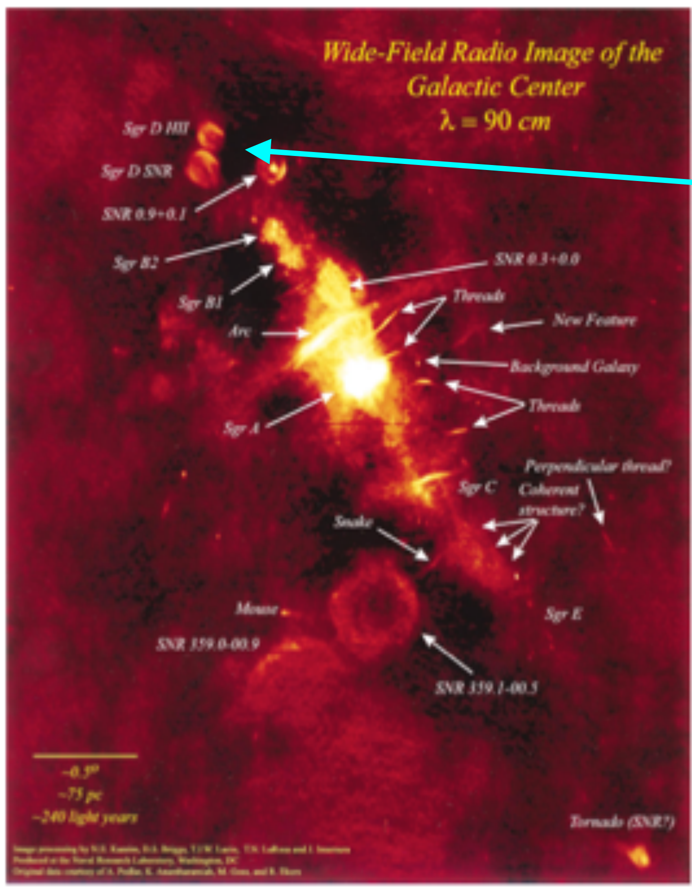
Star formation rates on global and cloud scales within the Galactic Centre

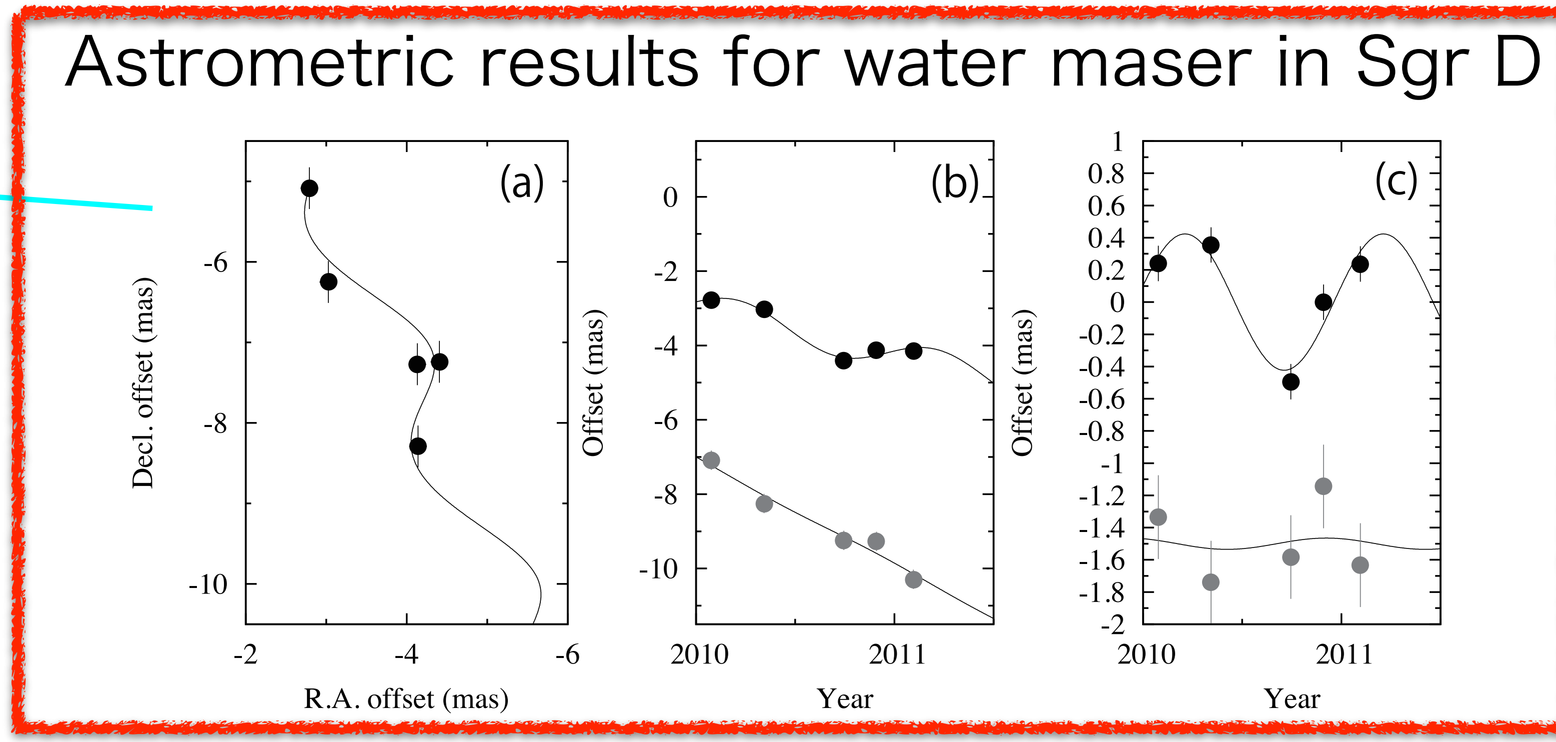
A.T. Barnes, S.N. Longmore, C. Battersby, J. Bally, J. M. D. Kruijssen



Daisuke Sakai (Univ. of Tokyo)

VLBI astrometry toward Sgr D HII region with VERA





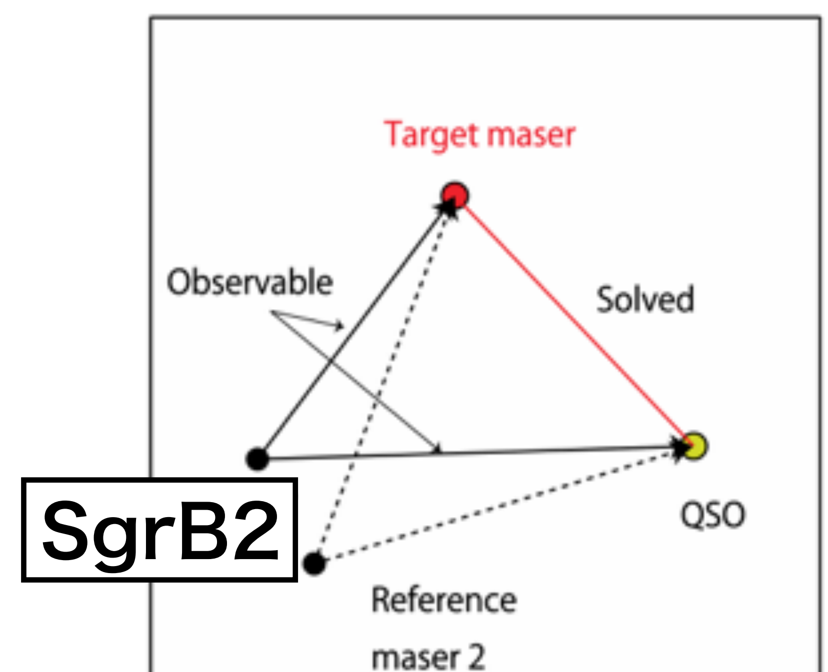
Parallax distance is 2.36(-0.39/+0.58) kpc
which suggests this source is located at **Scutum** arm

Future plans

One of reasons for the difficulty of astrometry in GC is weakness of position reference QSO

By using Sgr B2 water maser as a reference,
we can measure absolute positions of weaker maser sources than before. (10 Jy to 2-3 Jy)

Preliminary result in my poster



Constraining the Variability and Binary Fraction
of Young Stars in the Galactic Center

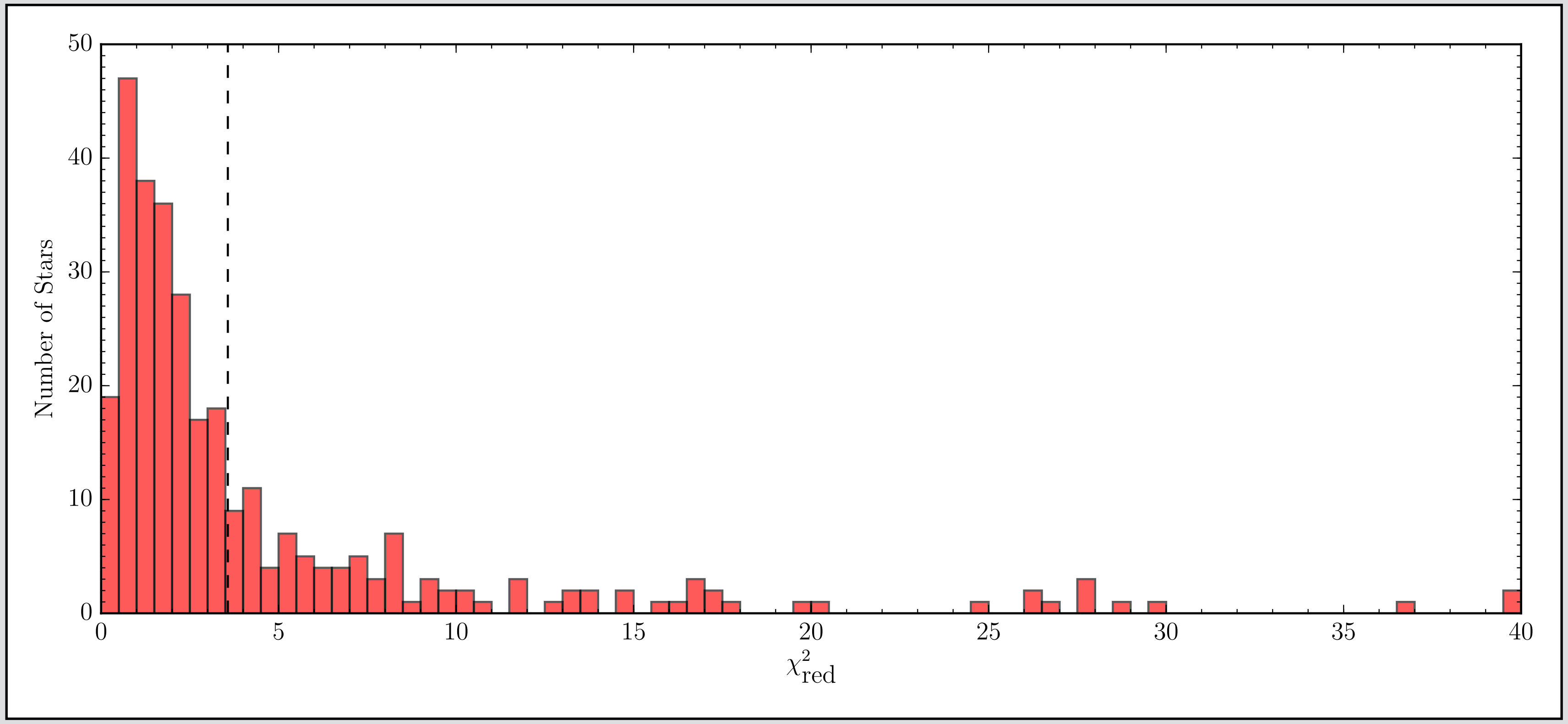
Abhimat Gautam
UCLA Galactic Center Group

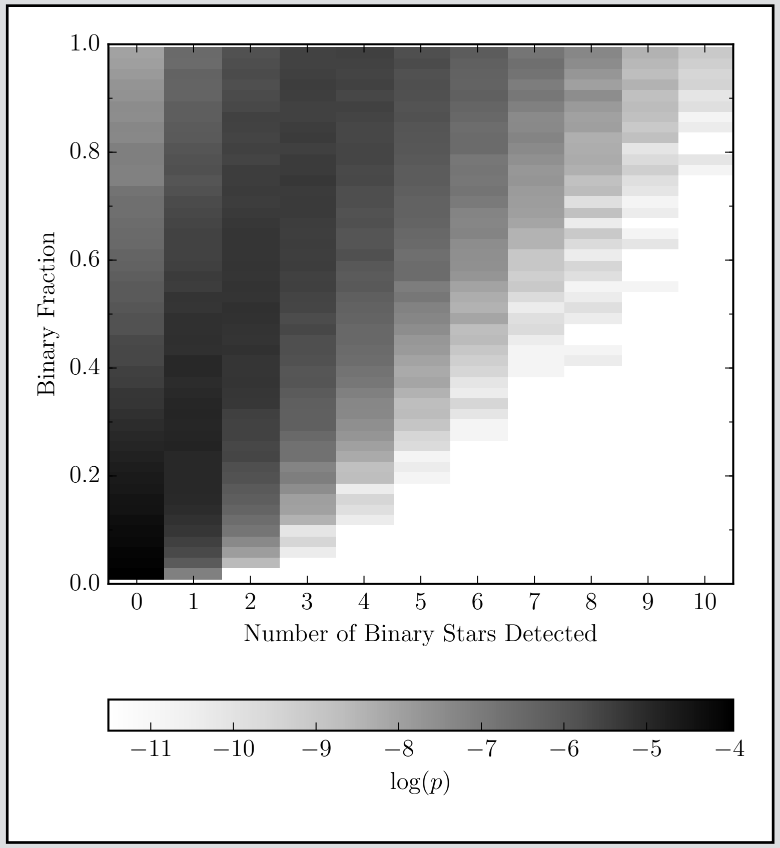
Keck Adaptive Optics photometric data set over 12 years

Photometric analysis can identify **stellar variability** and **binarity**

Variability and binarity helpful for understanding origin of young stars

Initial constraints on the variability of binary fraction of young stars

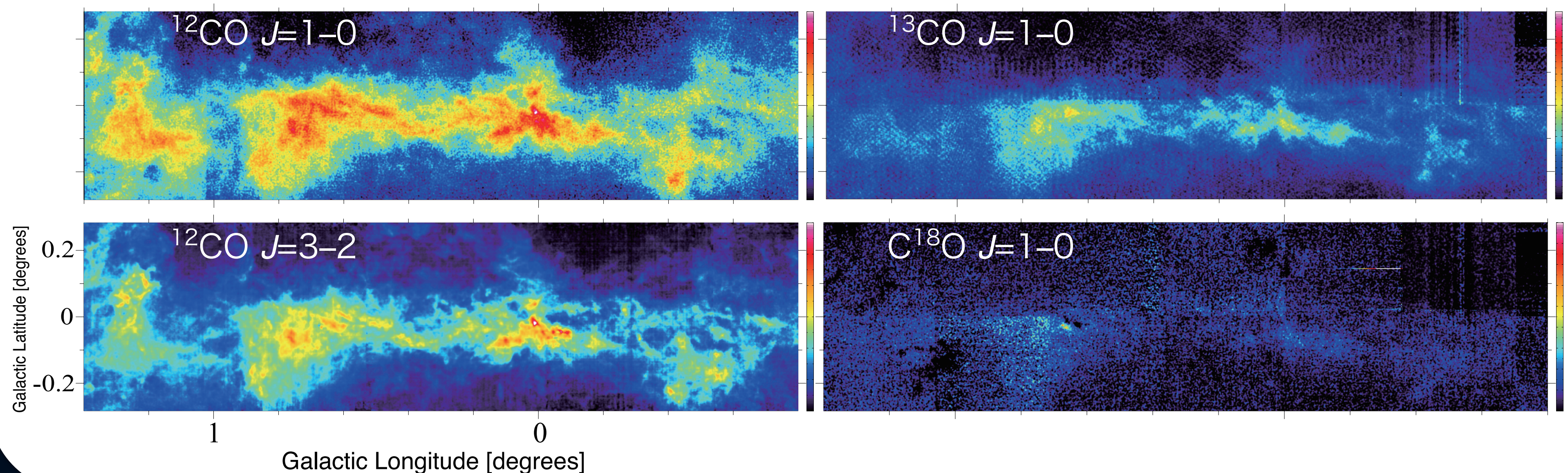




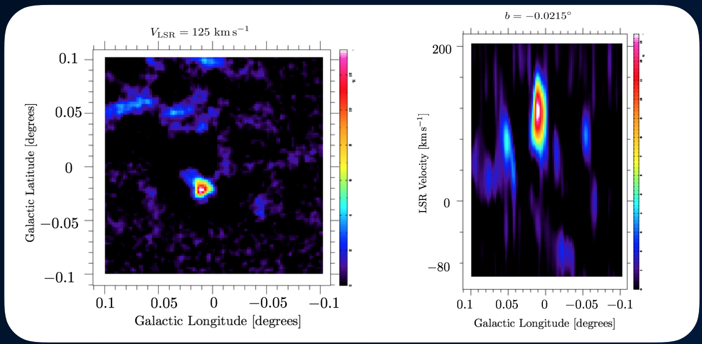
Statistical Study of High-Velocity Compact Clouds Based on the Complete CO Imagings of the Central Molecular Zone

Sekito Tokuyama, et al. Keio University

We performed a complete CO J=1–0 imaging of the CMZ and developed an automated procedure to identify High-Velocity Compact Clouds (HVCCs).



HVCC
CO 0.02–0.02

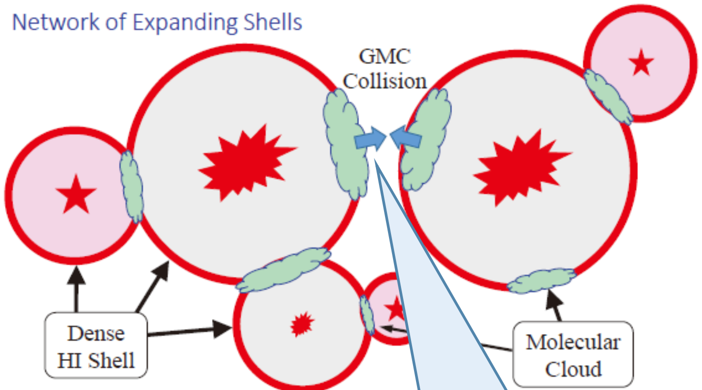


We identified 116 HVCCs and performed statistical study.

Time Evolution of the **Giant Molecular Cloud Mass Functions** across Galactic Disks

Masato I.N. Kobayashi (Nagoya U)

1) Inutsuka+ 2015



Cloud-Cloud Collisions (CCCs)

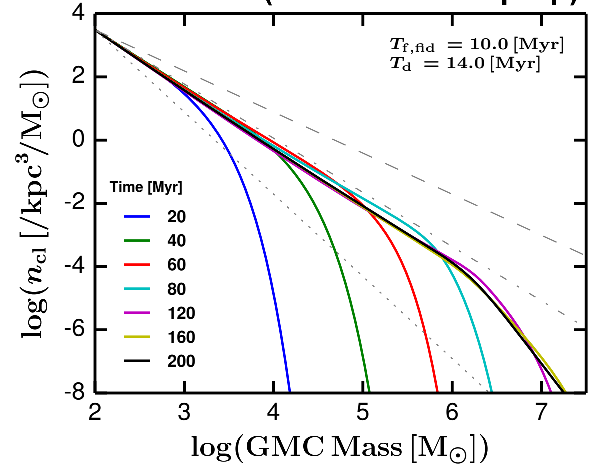
Fukui+ 2014
Nakamura+ 2012
Torii+2015 etc

2) Formulate **coagulation equation** of GMC Mass Function

$$\frac{\partial n_{\rm cl}}{\partial t} + \frac{\partial}{\partial m}\left(n_{\rm cl}\frac{{\rm d}m}{{\rm d}t}\right) = -\frac{n_{\rm cl}}{T_{\rm d}} + \frac{1}{2}\int_0^\infty\int_0^\infty K(m_1, m_2) n_{{\rm cl},1} n_{{\rm cl},2} \times \delta(m - m_1 - m_2){\rm d}m_1{\rm d}m_2 - \int_0^\infty K(m, m_2) n_{\rm cl} n_{{\rm cl},2}{\rm d}m_2$$

3) Successfully **reproduce observed variation** of GMC mass functions.

(MINK+ 2016 in prep)



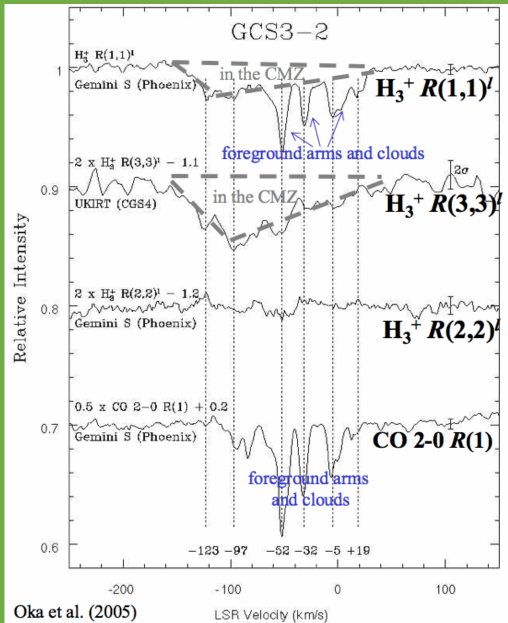
4) Observations may **put unique constraints on GMC formation/dispersal timescales** by observing the mass function slope.

Steady State Solution

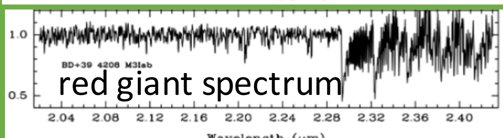
$$n_{\rm cl}(m) = \frac{N_0}{M_\odot}\left(\frac{m}{M_\odot}\right)^{-1-\frac{T_{\rm f}}{T_{\rm d}}}$$

BACKGROUND INFRARED SOURCES FOR STUDYING INTERSTELLAR GAS IN THE CENTRAL MOLECULAR ZONE

Tom Geballe (Gemini) et al.



Oka et al. (2005)



Motivation:

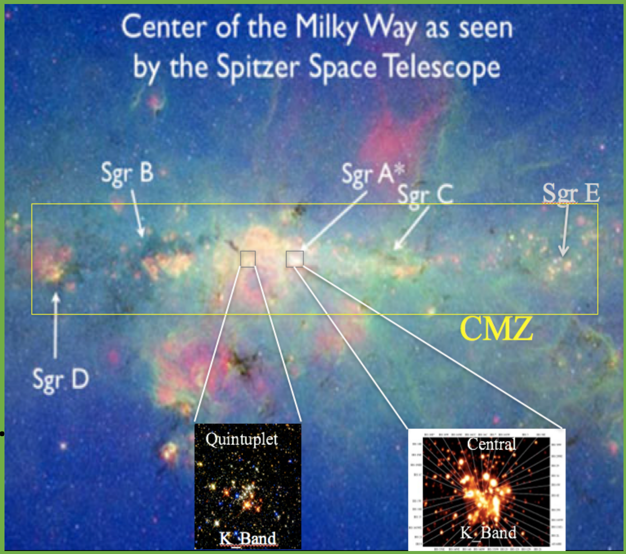
Spectroscopy of H_3^+ has revealed long columns of **diffuse, warm, expanding gas** on sightlines toward the center of the CMZ.

Is this gas present throughout the CMZ?

Need high-resolution IR abs. spectroscopy of H_3^+ on widely spaced sightlines.

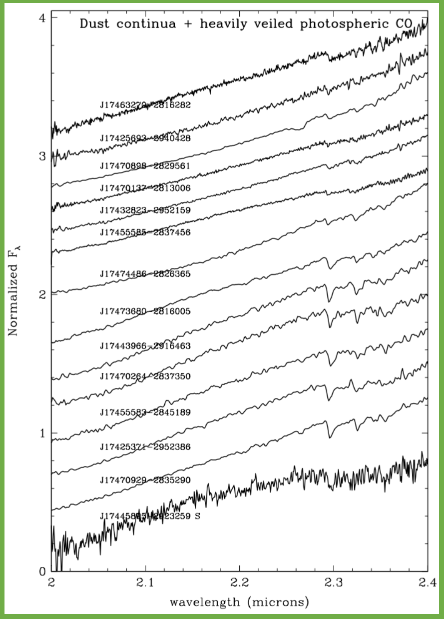
➔ Need to find **bright IR sources with "featureless" spectra** elsewhere in the CMZ.

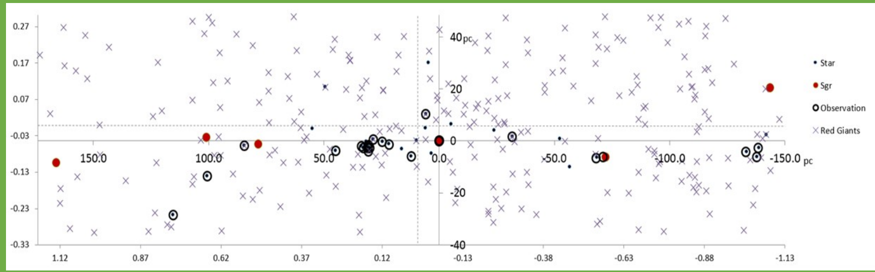
Problem: vast majority of bright IR stars in the GC are red giants.



Project:

Use 2MASS and Spitzer (GLIMPSE) catalogues to identify candidate dust-embedded objects in the CMZ. Obtain quick low-res. *K*-band spectroscopy (mostly in Gemini poor weather time) to weed out RGs.





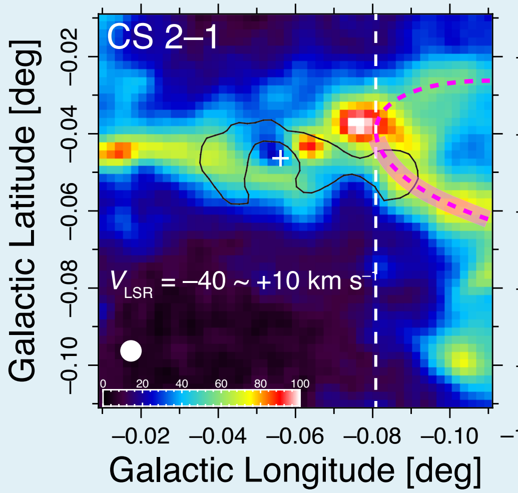
Results: >500 objects surveyed.
Mostly (cool) RGs, but also a menagerie of other useful and interesting objects (pure dust continua, heavily veiled RGs, hot stars).

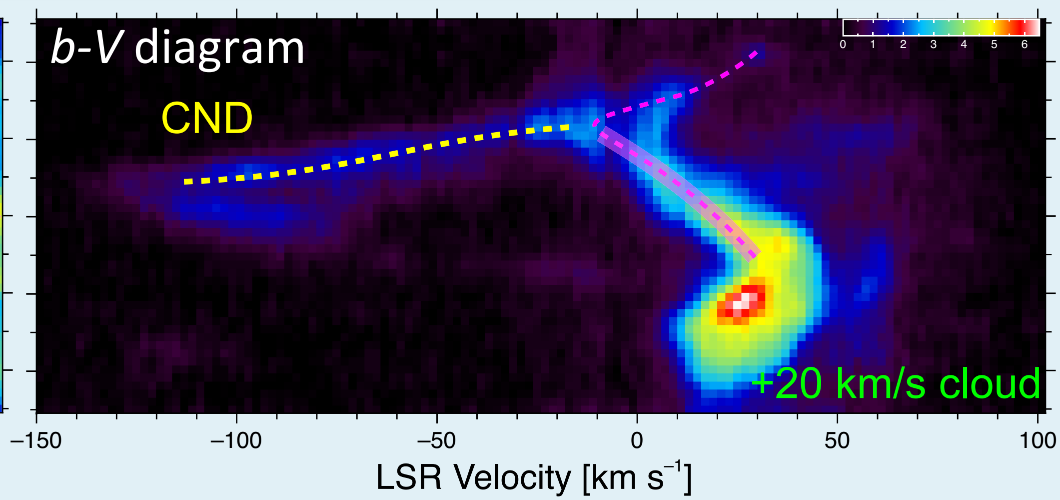
To see more examples and learn what we are finding by using them visit Poster Board 7!

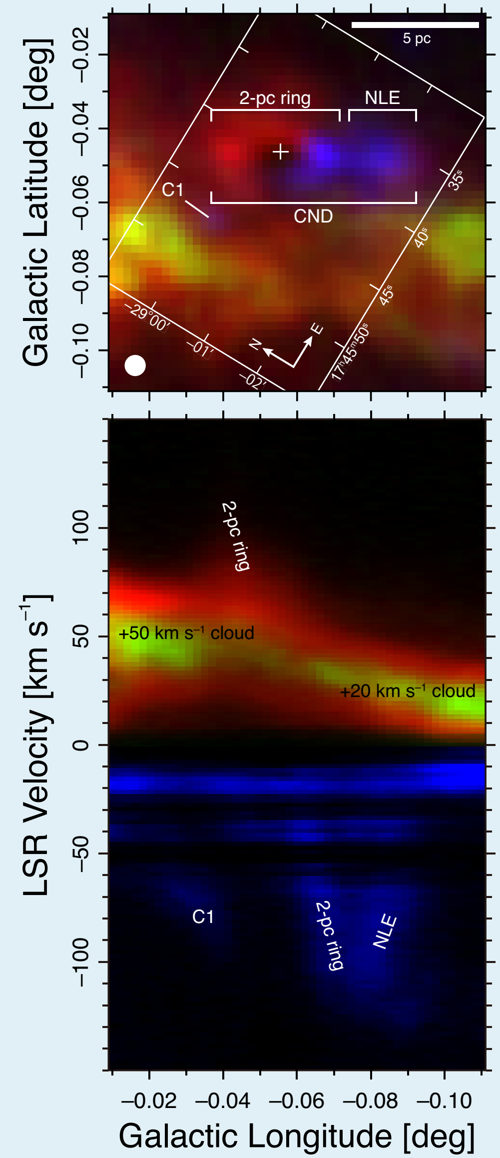
Physical Contact between the +20 km/s Cloud and the Galactic Circumnuclear Disk

Shunya Takekawa, et al. (Keio University)

We mapped the CND in molecular lines using the Nobeyama 45 m telescope.







We discovered an emission "bridge" which connects the +20 km/s cloud and the CND.

The asymmetric part of the CND may have plunged into the GMC.