

45m Legacy COMING

CO Multi-line Imaging of Nearby Galaxies

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and COMINGers

COMING
CO MULTI-LINE IMAGING OF NEARBY GALAXIES

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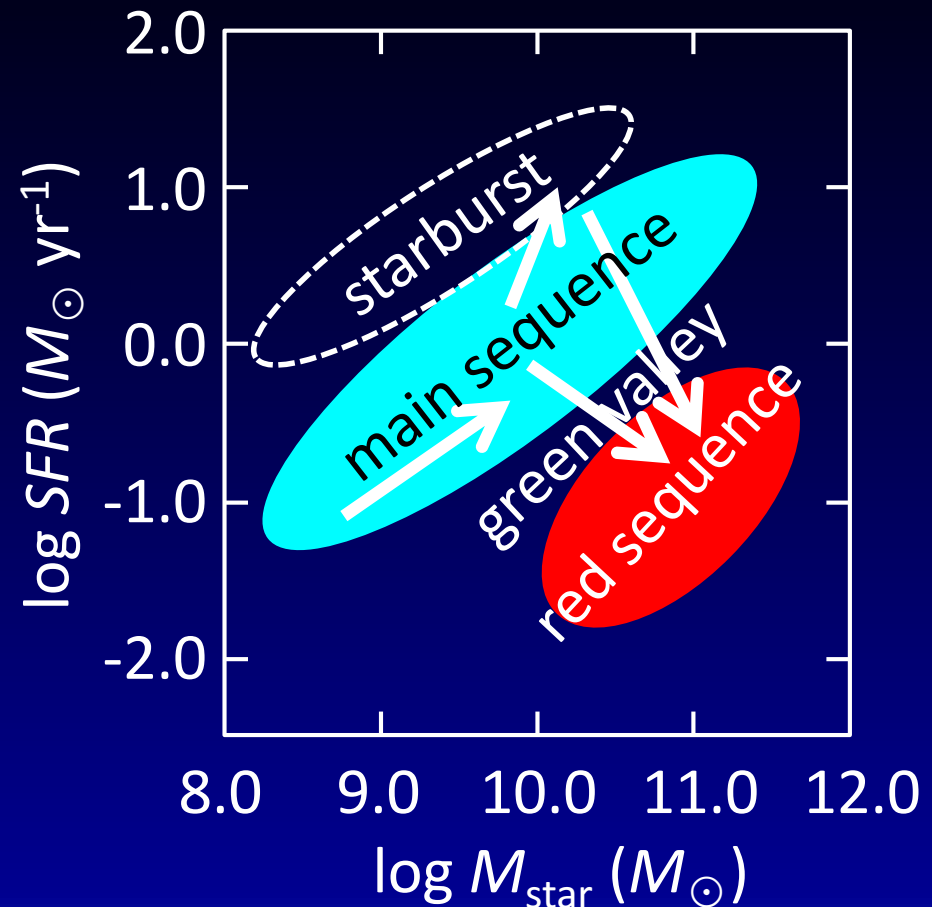
Takeda, M. *
Yanagitani, K. *
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CO MULTI-LINE IMAGING OF NEARBY GALAXIES

1. BACKGROUND

Molecular gas and star formation

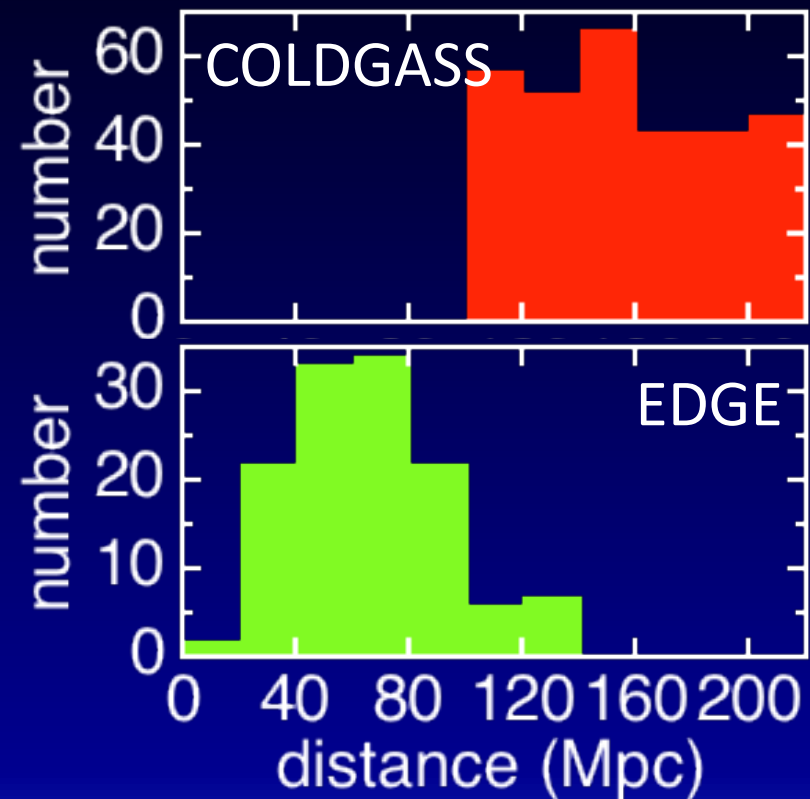
- molecular gas in the context of galaxy evolution
- what happens within a galaxy?
- lack of molecular gas information



(based on Schiminovich, et al. 2007)

Recent CO surveys

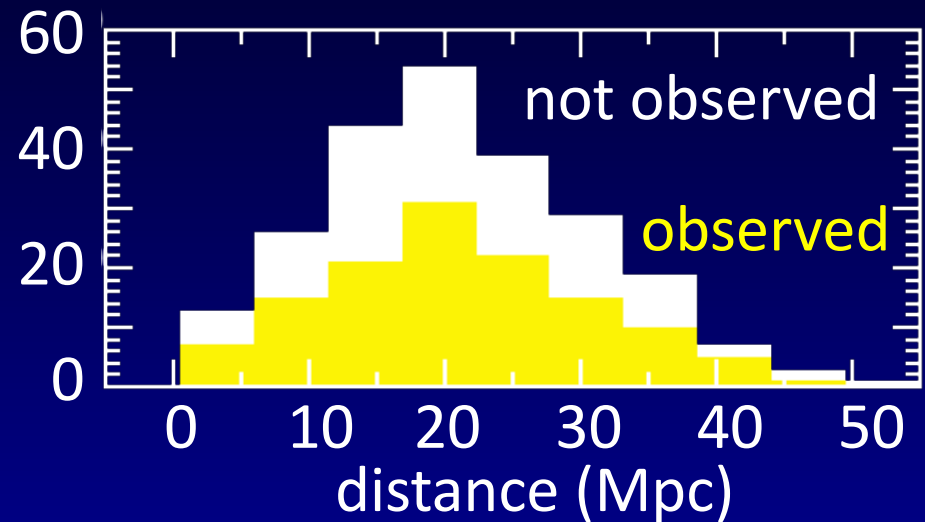
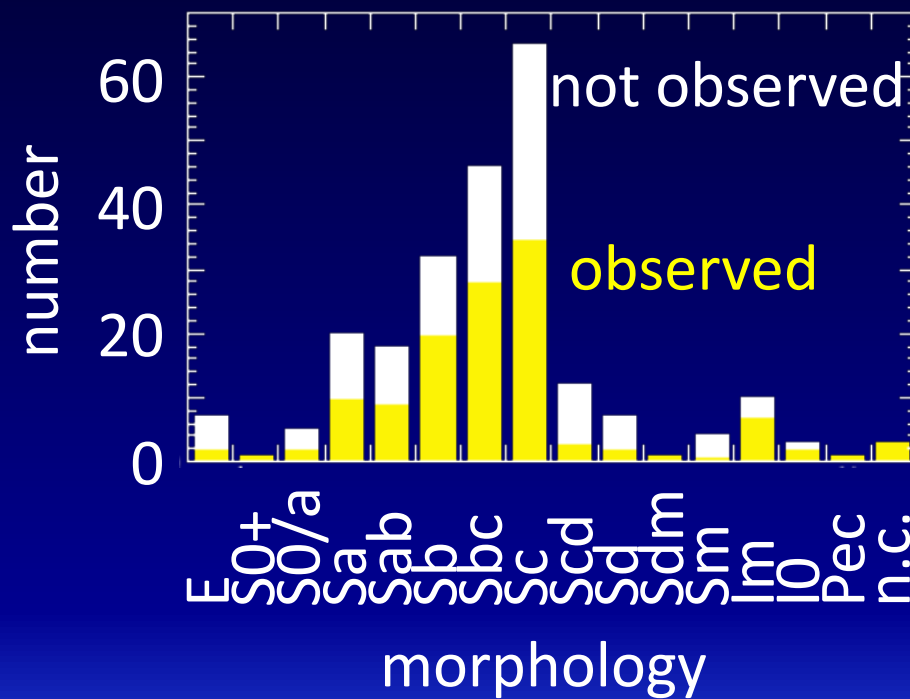
- COLDGASS (Saintonge+ 11)
> 300 galaxies, pointing
- EDGE (the Extragalactic Database for Galaxy Evolution survey)
(Bolatto+ 17)
126 galaxies, CARMA



2. SAMPLES & OBSERVATIONS

Original & observed samples

- targets: **238 FIR bright** galaxies
- morphology
- distance

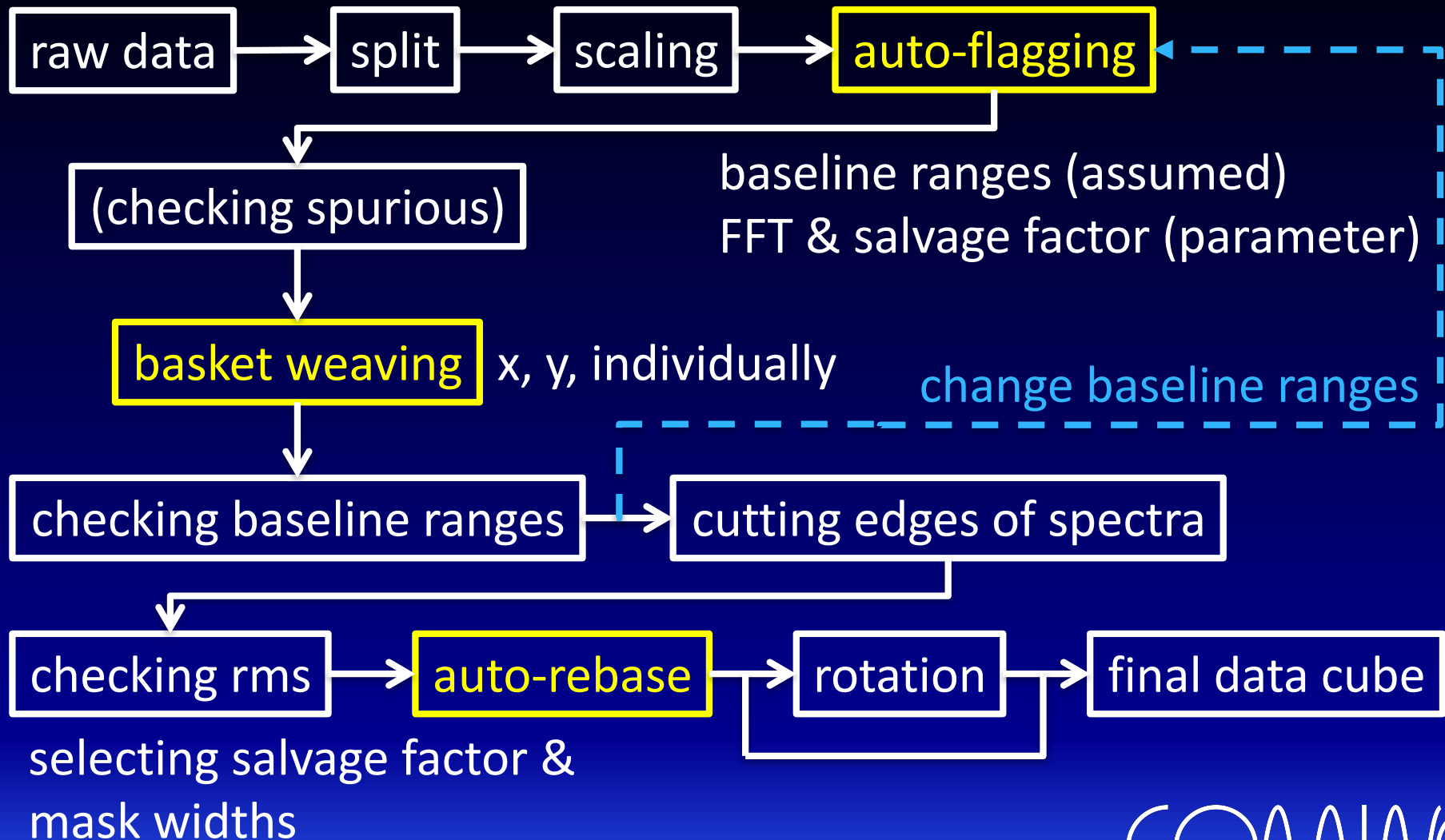


Observations

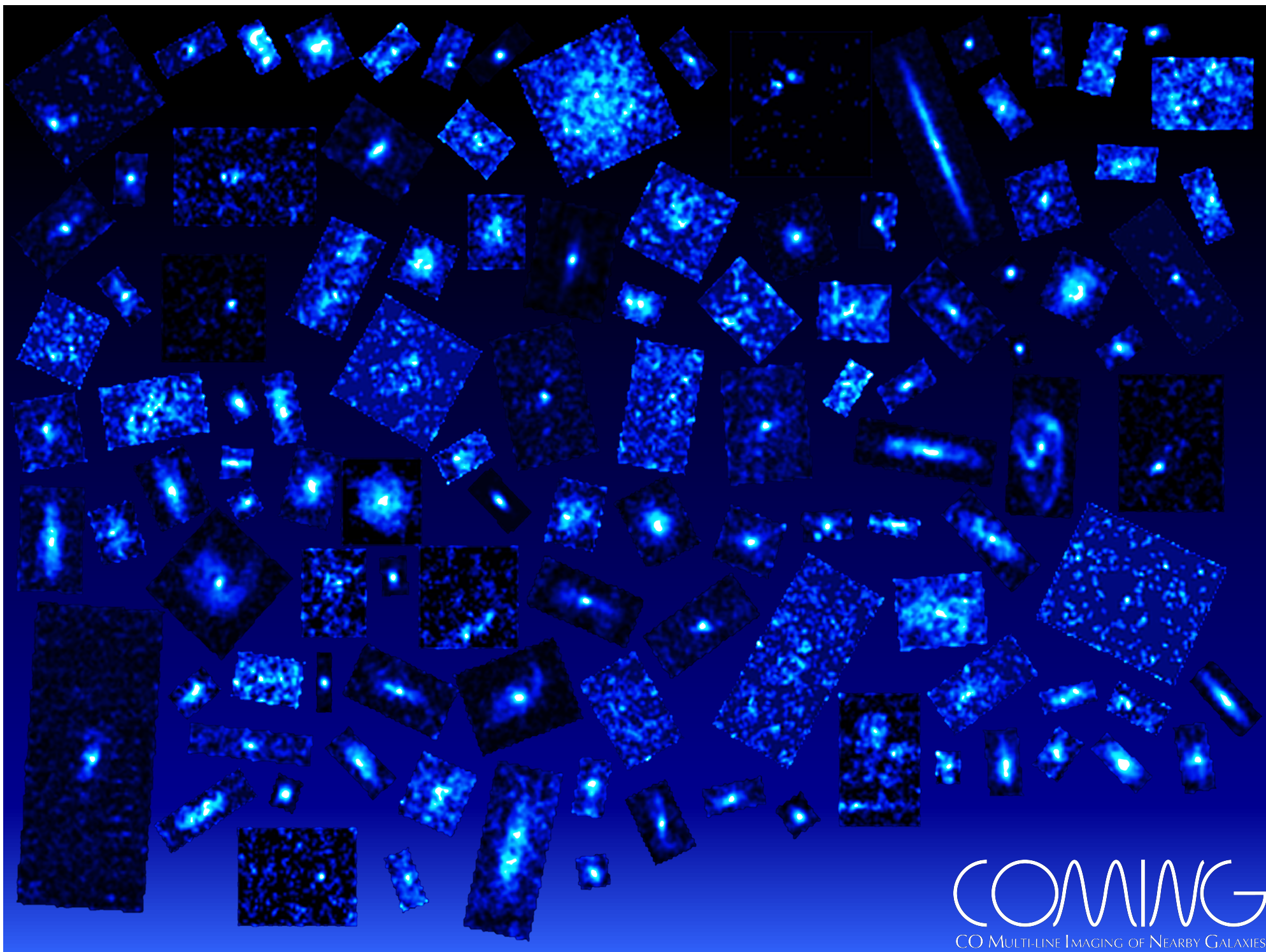
- **OTF** with **the 45-m telescope** w/ **FOREST**
- 2015, Apr. – 2017, Mar. ($\sim 1,320$ hr)
- **^{12}CO , ^{13}CO , C^{18}O $J=1-0$** (simultaneously)
- $\Delta v = \mathbf{10 \text{ km s}^{-1}}$
- $\Delta T_{\text{A}}^* = \mathbf{30 \text{ mK}}$
- mapping area: **70% of D_{25}**
- observed targets: **127** galaxies
(~ 53 % of the original samples)



Auto-Reduction Tool (*COMING ART*)



3. RESULTS



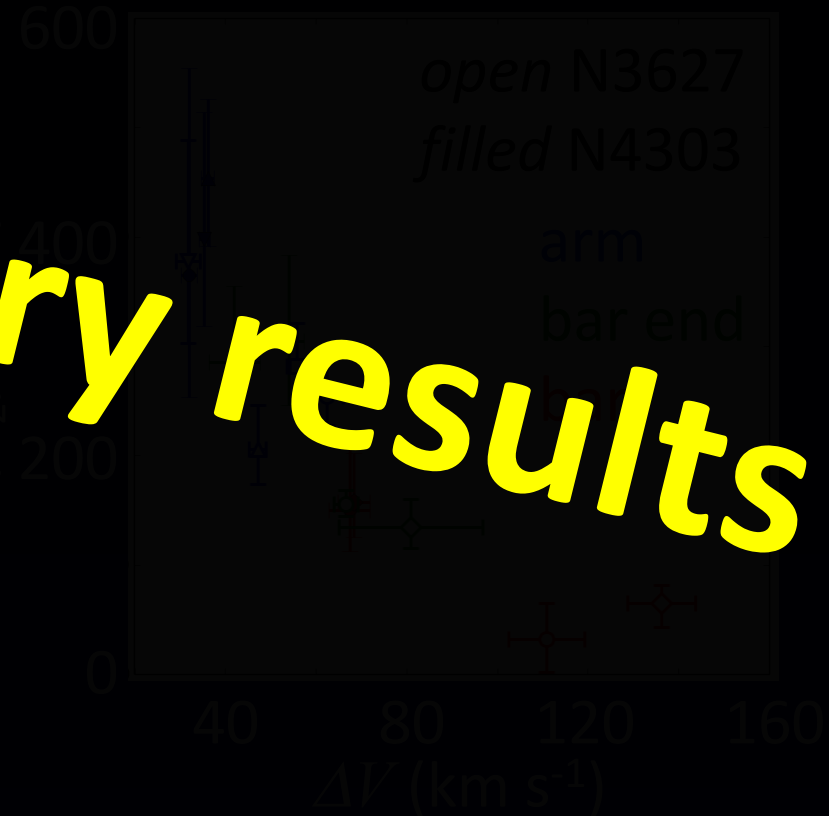
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Molecular gas in barred spirals

- COMING (^{12}CO & ^{13}CO $J=1-0$) + JCMT (^{12}CO $J=3-2$) & RADEX

preliminary results

- less dense and large velocity width in bar
- Yajima, et al., *in prep.*

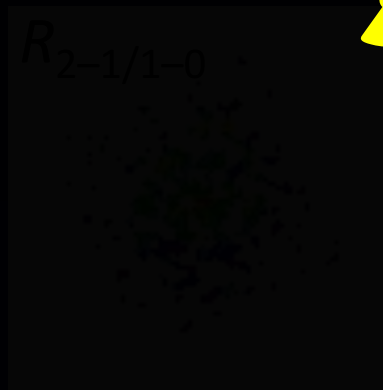
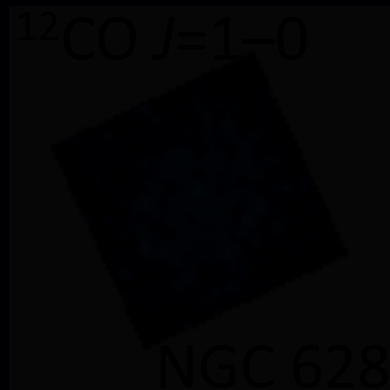


Molecular gas and star formation

- COMING ($^{12}\text{CO } J=1-0$) + IRAM ($^{12}\text{CO } J=2-1$)

- $^{12}\text{CO } J=2-1 / J=1-0 (\equiv R_{2-1/1-0})$

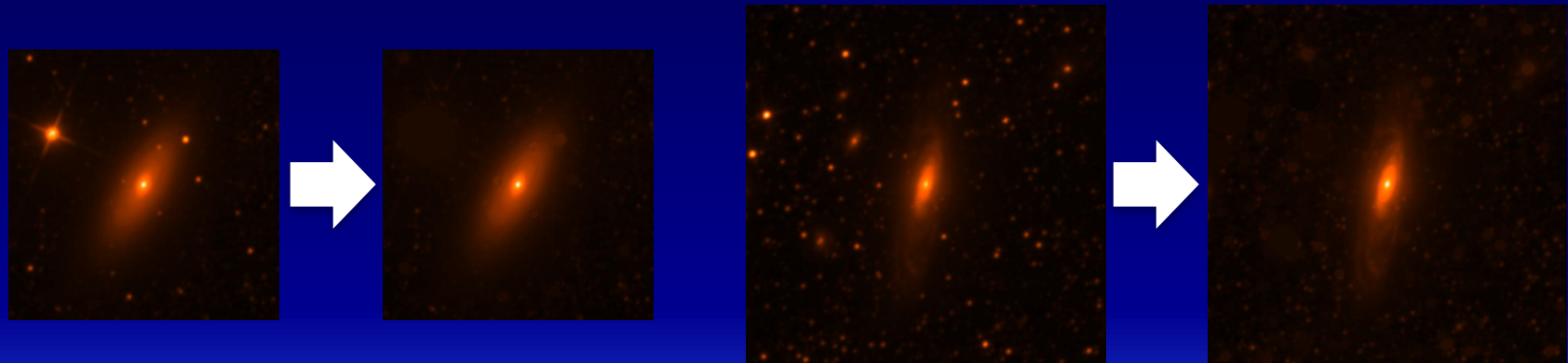
preliminary results



- Komatsuzaki & Kuno, this morning

Deriving stellar mass

- using WISE 3.4 μm because we can get data of the whole targets
- but many Galactic stars in each field...
- auto-masking tool has been completed, then soon deriving stellar mass



4. STATUS & NEAR FUTURE PLAN

Observations

- observations of not-observed targets
 - we'd like to complete our original targets
 - in especial, **galaxies with large appearance**
- multi-transition observations (**$J=2-1$, $J=3-2$**)
 - deriving physical properties more precisely
- high-resolution observations with ALMA
 - what happens in **GMA – GMC scale**

Scientific activity

- sub-working groups
 - distribution & dynamics (**DD**): **Miyamoto**
 - physical properties (**PP**): **Muraoka**
 - environmental effect (**EE**): **Kaneko**
 - welcome to join us now, please contact us
- planning a workshop “COMING 2018”

Publication Plan

1. NGC 2903: Muraoka+ 2016, PASJ, **68**, 89
2. NGC 2976: Hatakeyama+ 2017, PASJ, **69**, 67
3. overview: Sorai+, in prep.
4. distribution & dynamics: Miyamoto+, in prep.
5. kinematics: Salak+, in prep.
6. SFE: Muraoka+, in prep.
7. conversion factor: Yasuda+, in prep.
8. group galaxies: Kaneko+, in prep.
9. NGC 4303: Yajima+, in prep.
10. resolved K-S relation: Yoda+, in prep.

5. SUMMARY

- COMING observed **127 galaxies**
- data reduction of > 110 galaxies has been completed
- achievement of 53%, but **stacking analysis** may help us
- now compiling our CO data and trying to derive stellar mass and star formation rate
- moving to observation & reduction phase to scientific activity phase