



Extragalactic Studies with ALMA Archival Data

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Extragalactic Studies with **Subaru** Archival Data

(C) Subaru

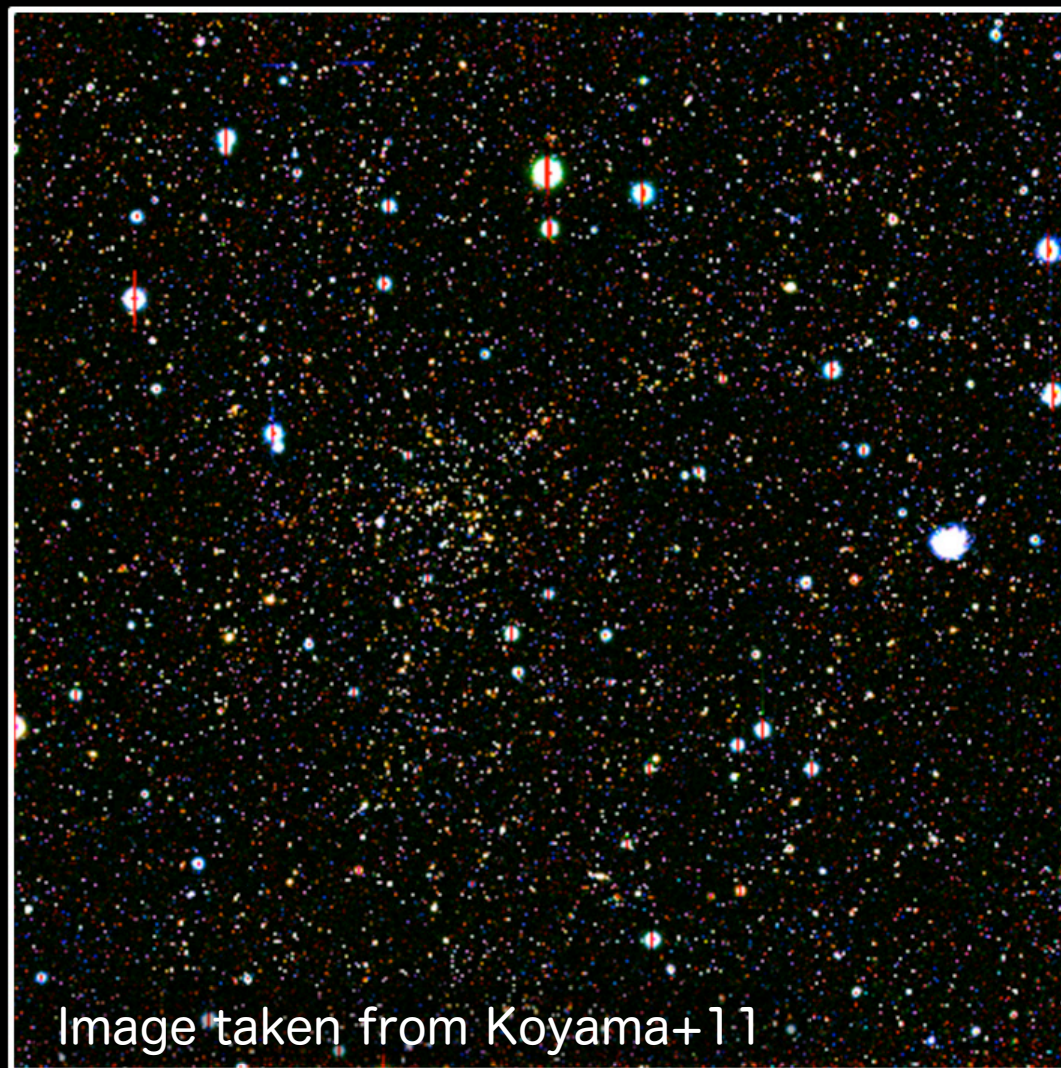
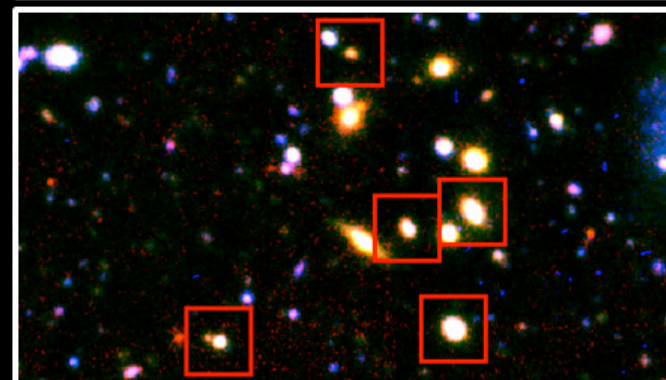
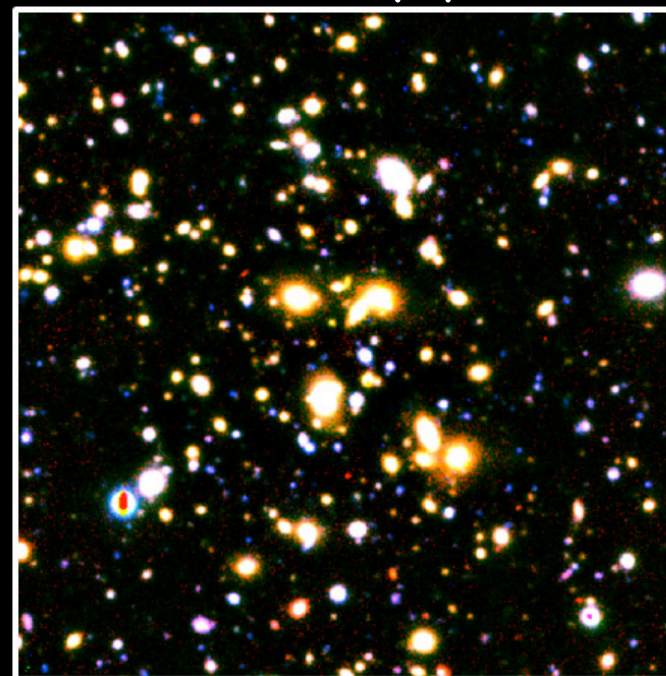


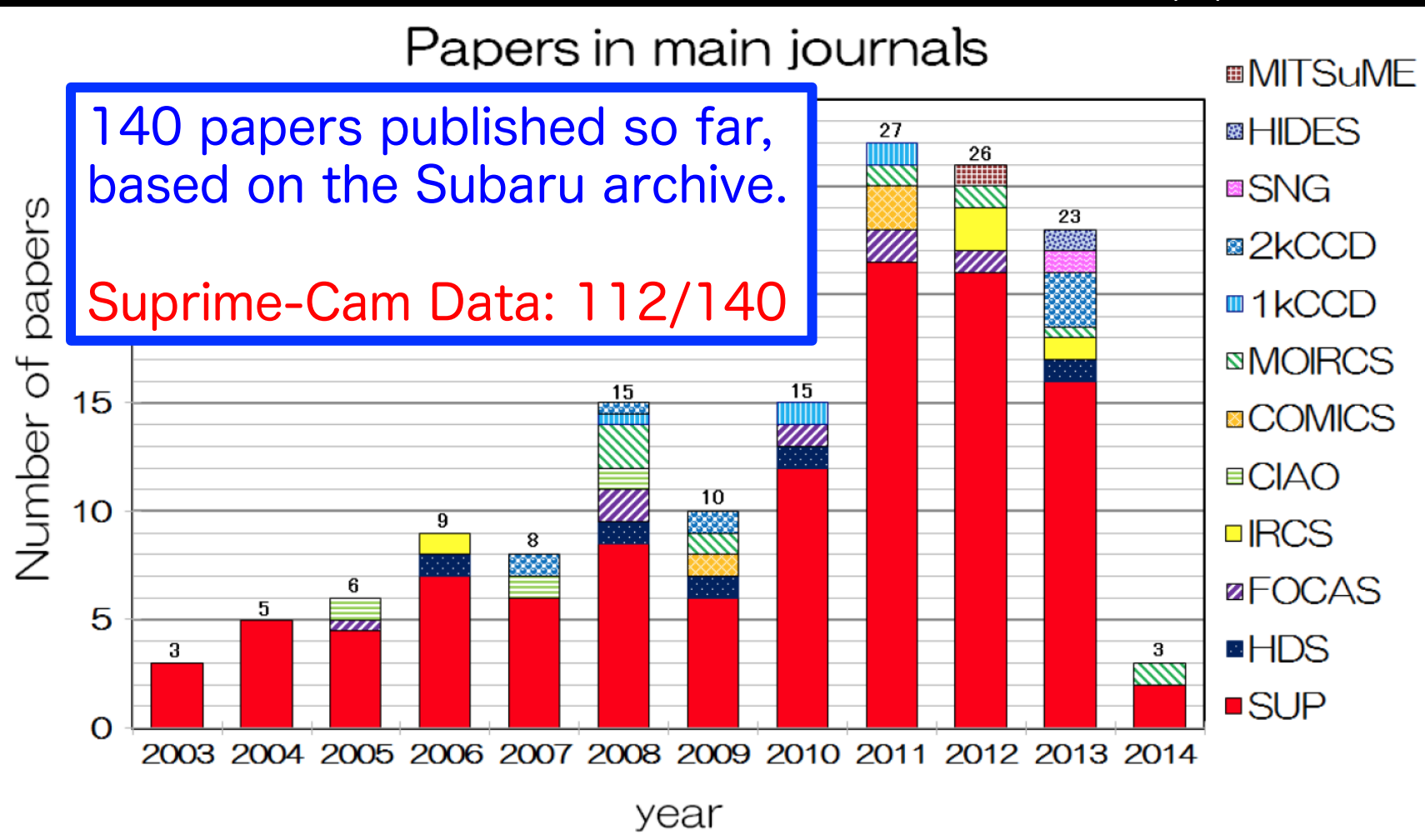
Image taken from Koyama+11





Extragalactic Studies with Subaru Archival Data

(C) SMOKA





Subaru/Suprime-Cam

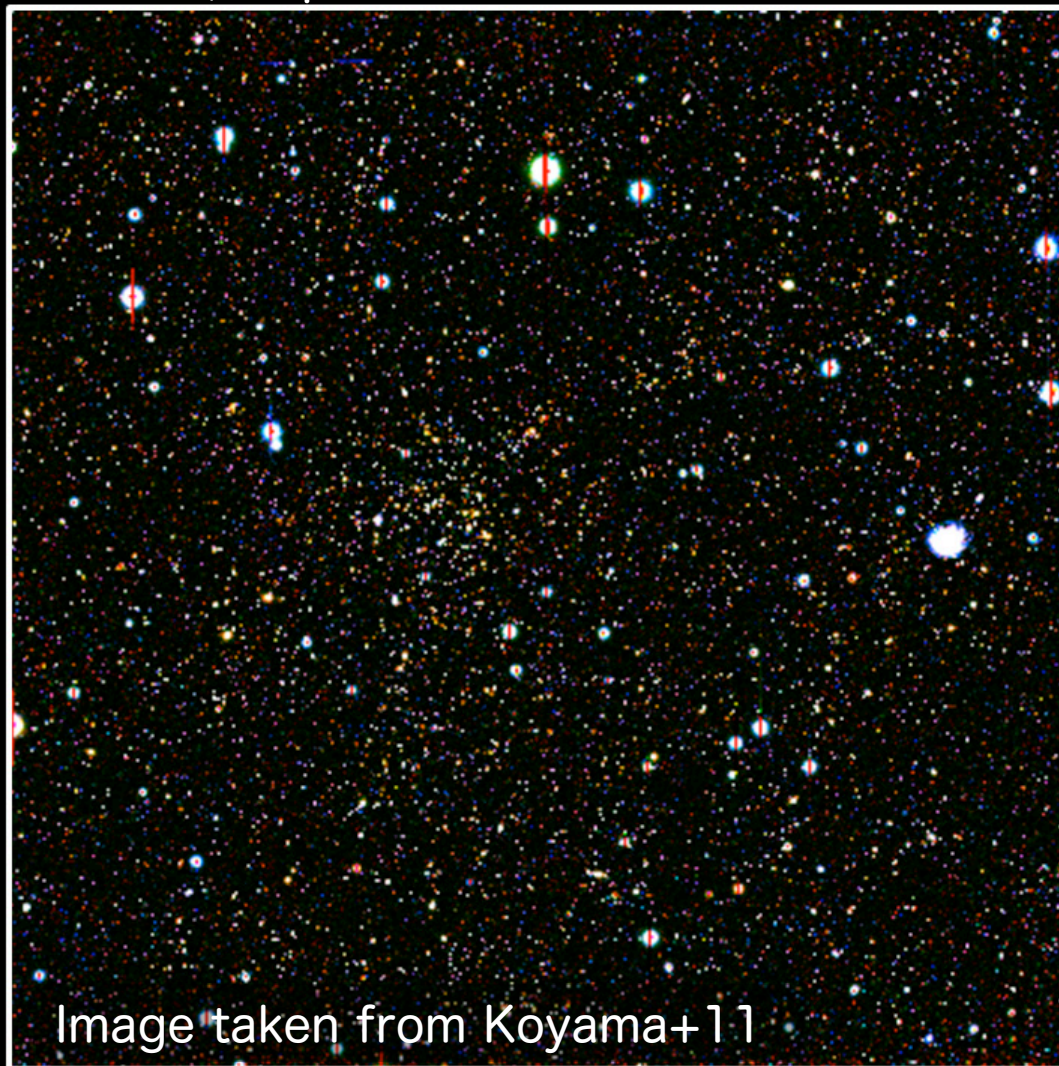


Image taken from Koyama+11

ALMA archive:

NOT for
target findings
for detailed studies

ALMA Primary Beam Size

Band 3 Band 9





Extragalactic Studies with ALMA Archival Data

- 1) Gathering many data → Statistics
- 2) New analysis for the archival data
- 3) Combining with the own new data

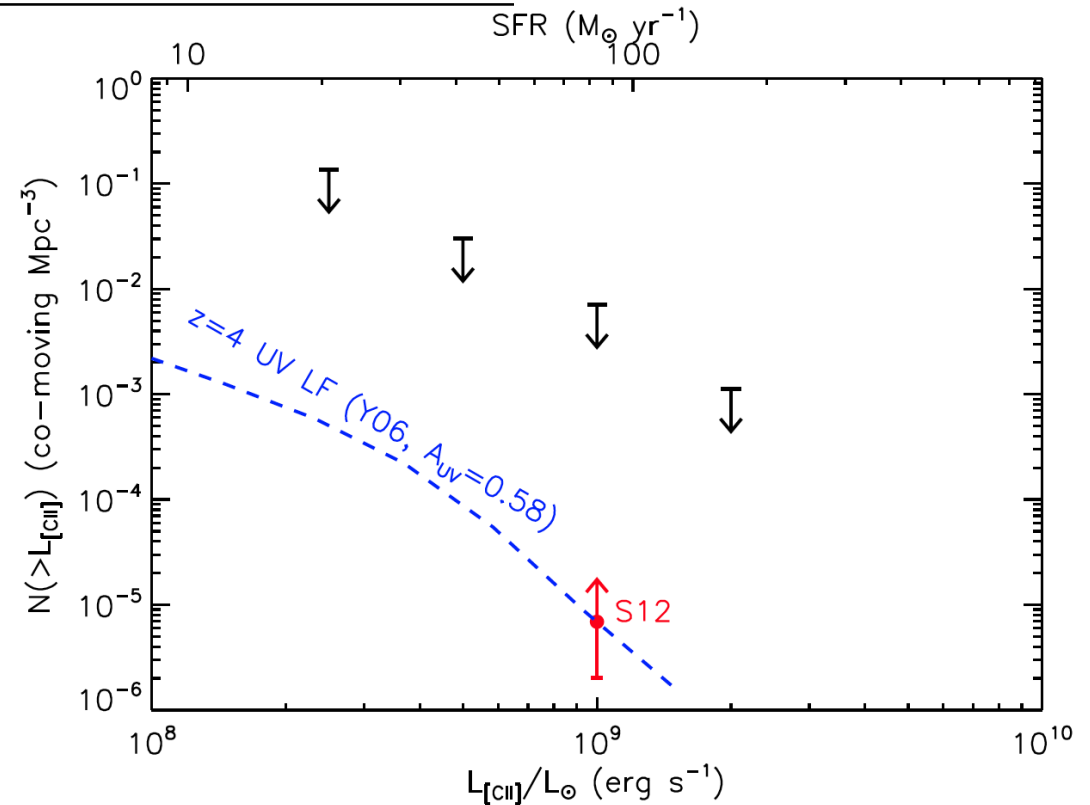


1) Gathering many data → Statistics

Project ID	Targets	# of Fields	Antennas	RMS ^a (mJy)	Synthesized beam (FWHM)
2011.0.00020.S	NGC1614	1	16	0.65 – 0.70	1''.5 – 1''.4
2011.0.00039.S	SBS0335–052	1	24	0.14 – 0.18	0''.7 – 0''.5
2011.0.00097.S	COSMOS	114	17 – 24	0.67 – 2.3	0''.4 – 1''.0
2011.0.00101.S	GRBs	2	17 – 20	0.39 – 0.48	0''.9 – 1''.6
2011.0.00108.S	NGC1097	1	14 – 15	0.35 – 0.42	1''.2 – 1''.5
2011.0.00208.S	NGC1433	1	19	0.33 – 0.39	0''.6 – 0''.4
2011.0.00294.S	ECDFS	122	12 – 15	1.1 – 5.4	1''.0 – 3''.8
2011.0.00467.S	VV114	3	18 – 20	0.27 – 0.30	1''.0 – 3''.8

Matsuda et al.,
in prep.

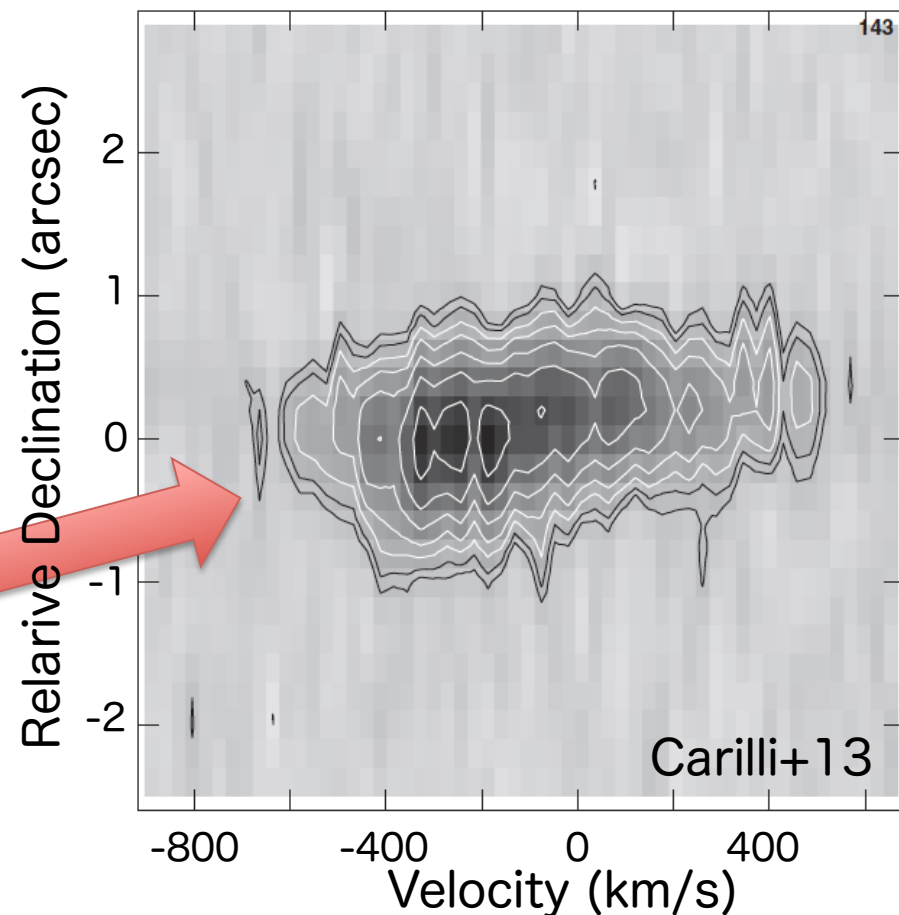
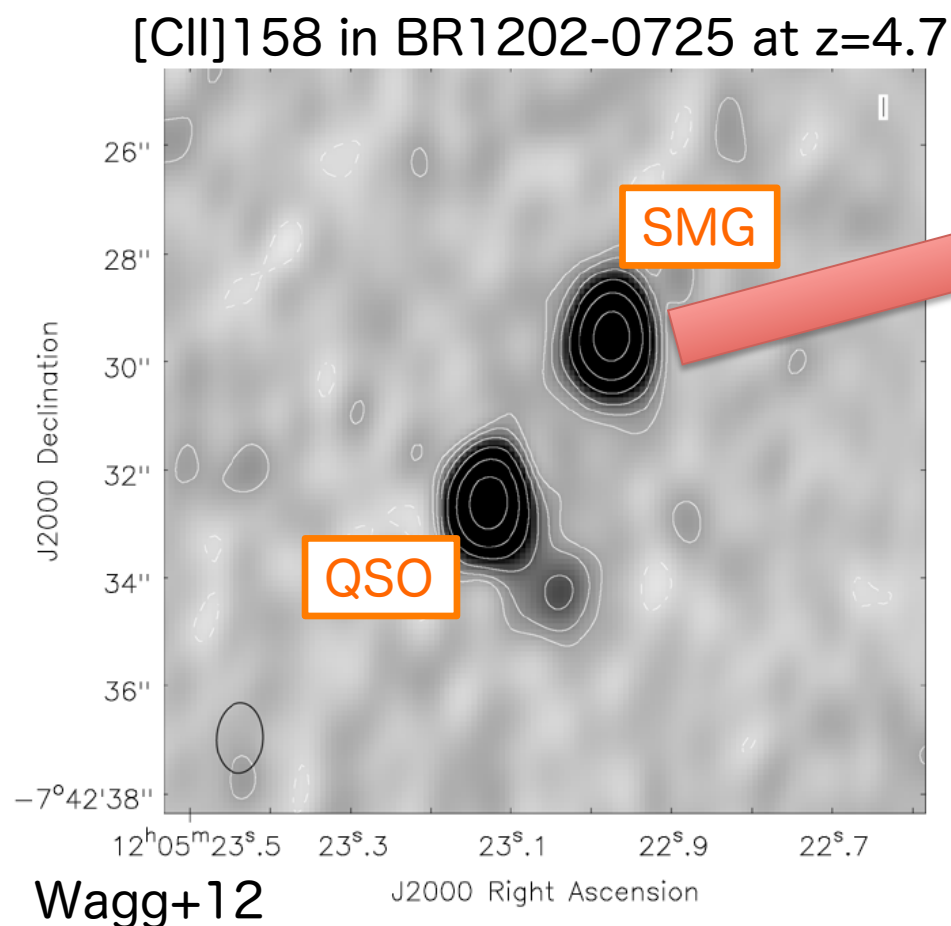
First trial for
studying the
[CII] luminosity
func. at $z \sim 4.5$
with the archive





2) New analysis for the archival data

Results from science verification data

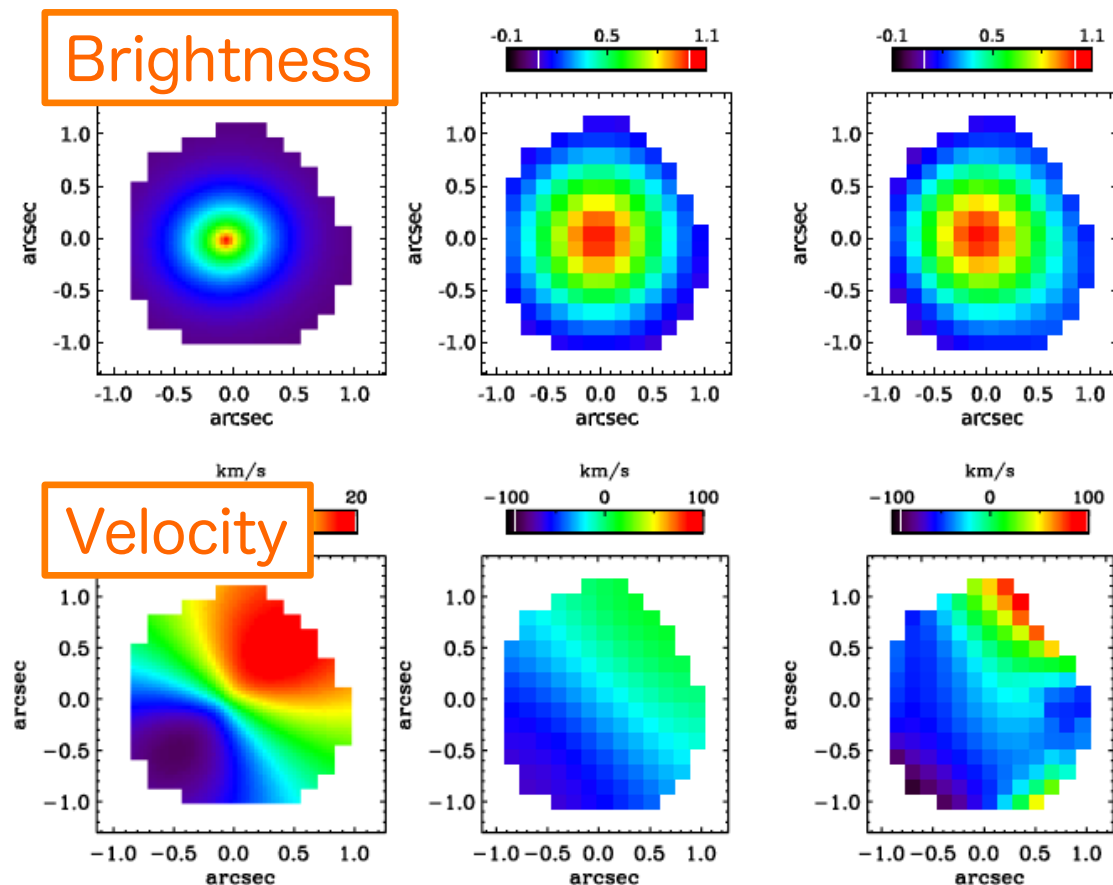


“A clear velocity gradient across the SMG, possibly indicating rotation or a more complex dynamical system on a scale ~ 10 kpc.” (from abstract)



2) New analysis for the archival data

2D disk-model fitting for QSO component in BR1202

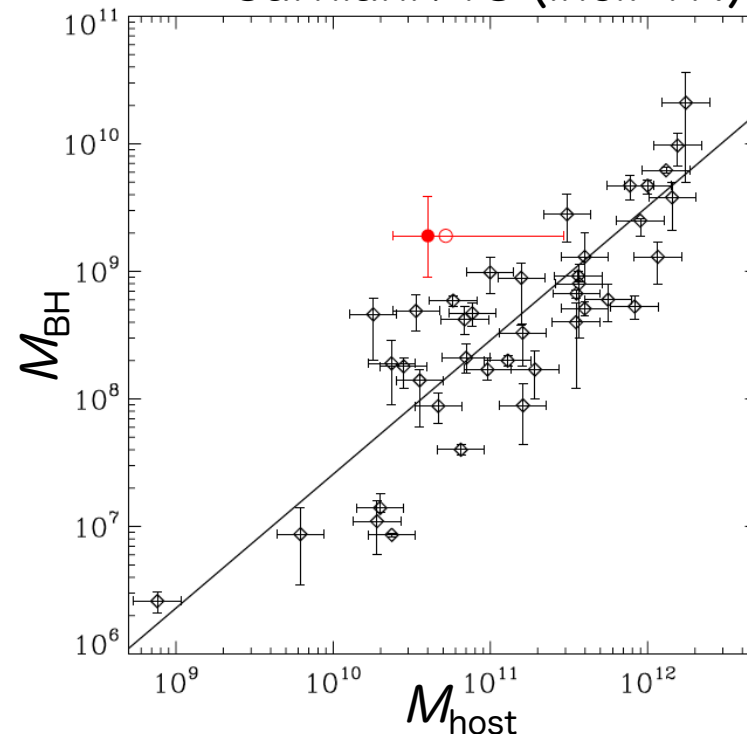


Model

Deconvolved

Observation

Carniani+13 (incl. TN)

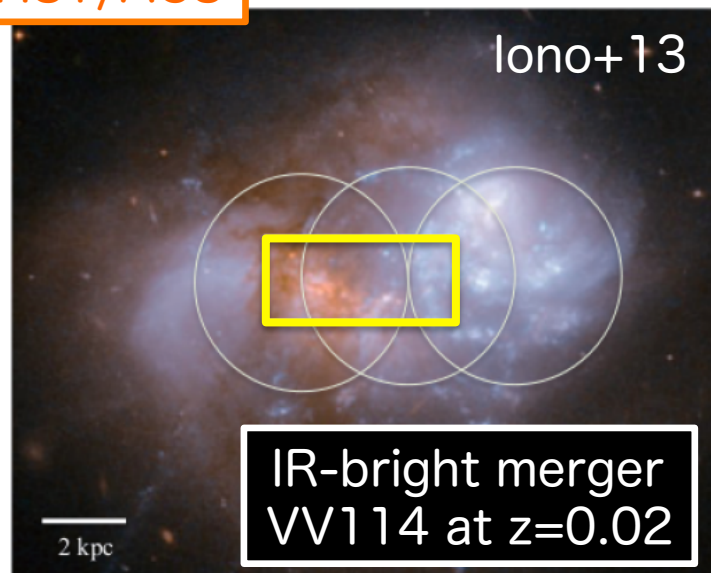


Possible evolution of
the $M_{\text{BH}}/M_{\text{host}}$ ratio at
high- z , inferred from
the new analysis
based on ARCHIVE !

2) New analysis for the archival data

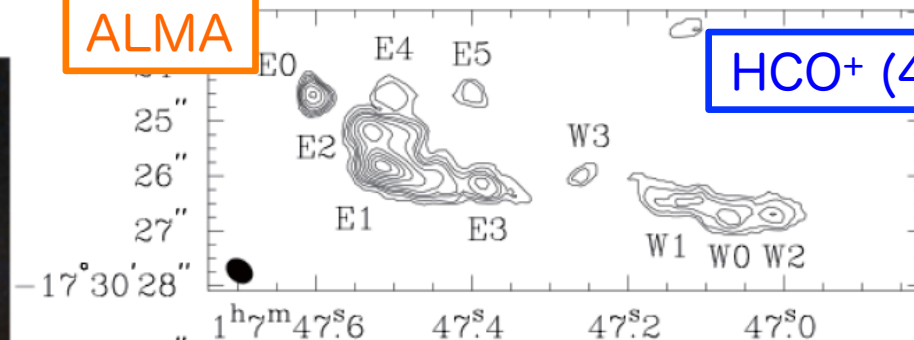


HST/ACS

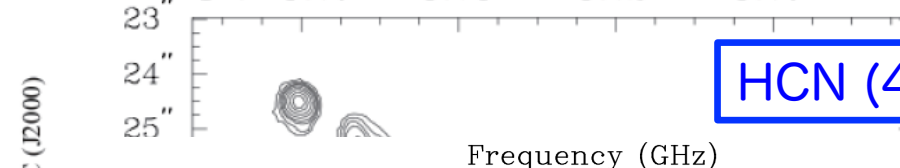


IR-bright merger
VV114 at $z=0.02$

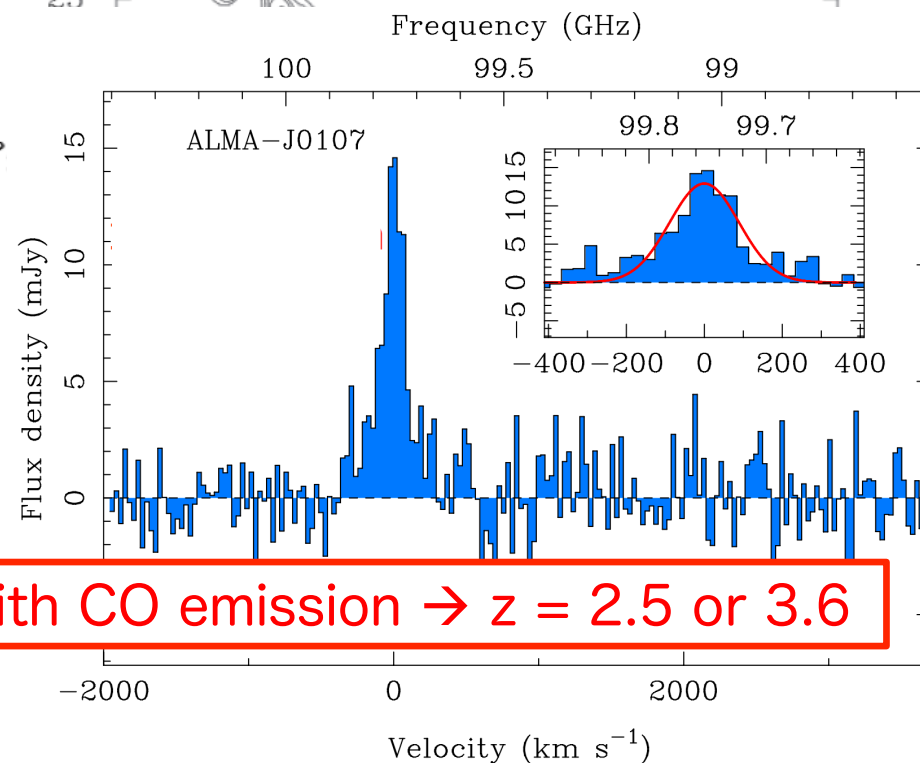
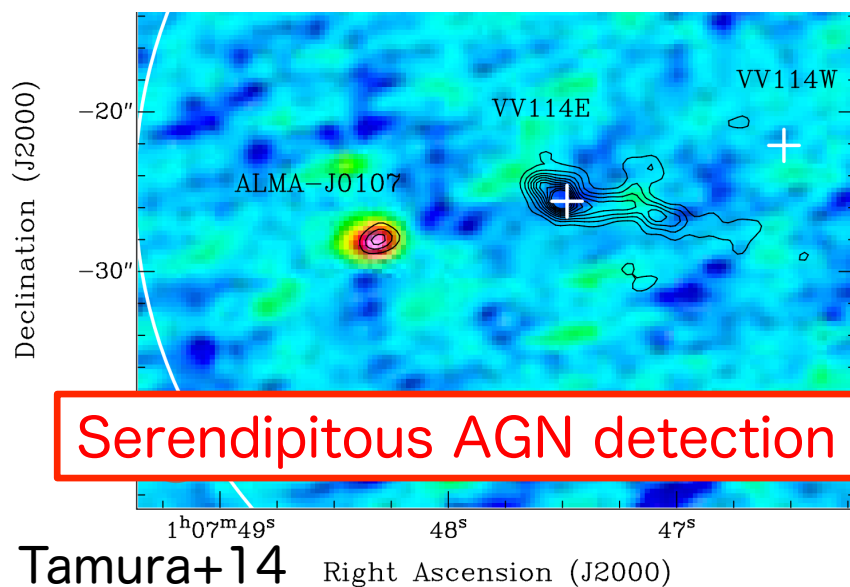
ALMA



HCO⁺ (4-3)

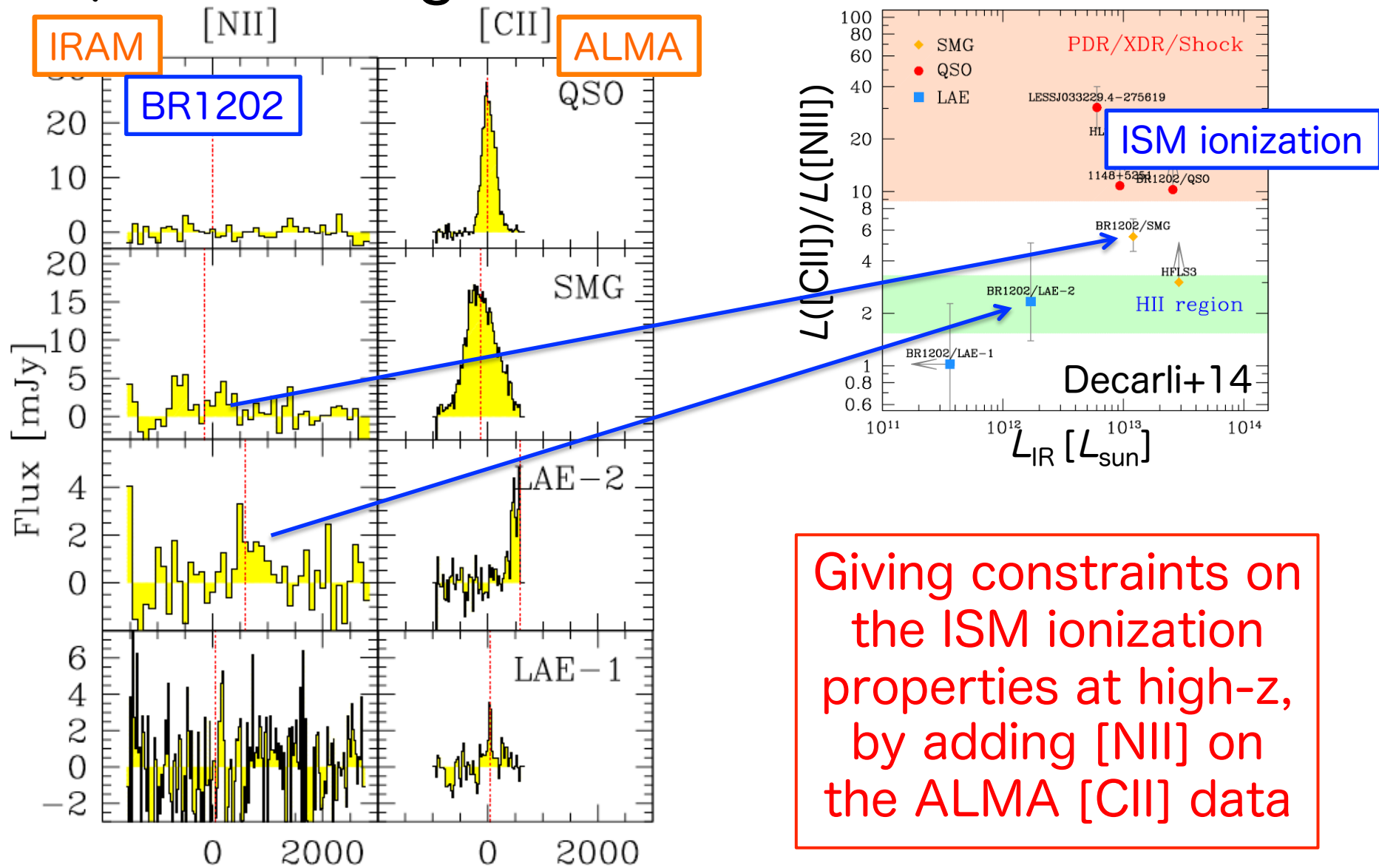


HCN (4-3)



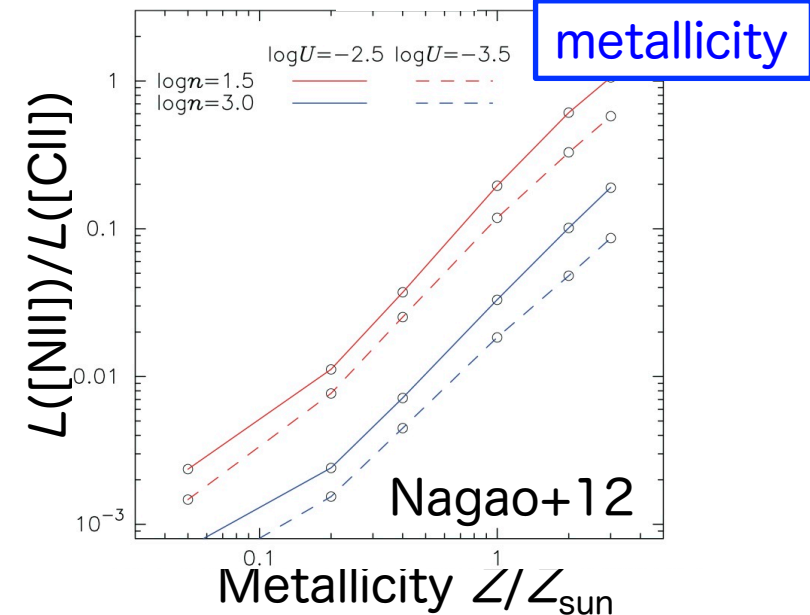
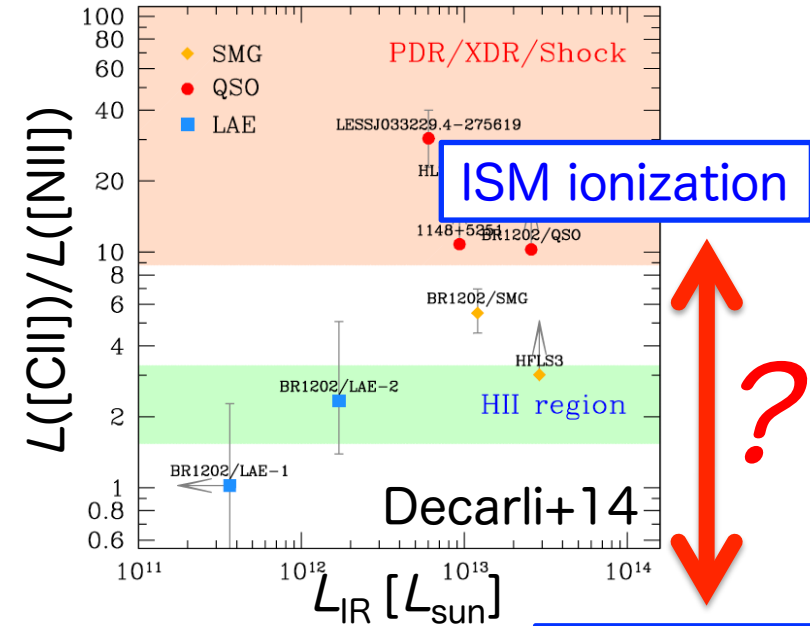
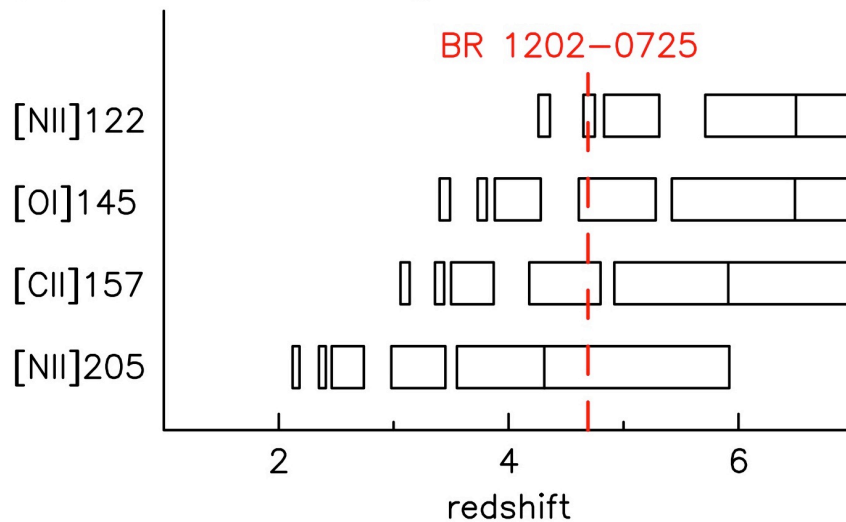
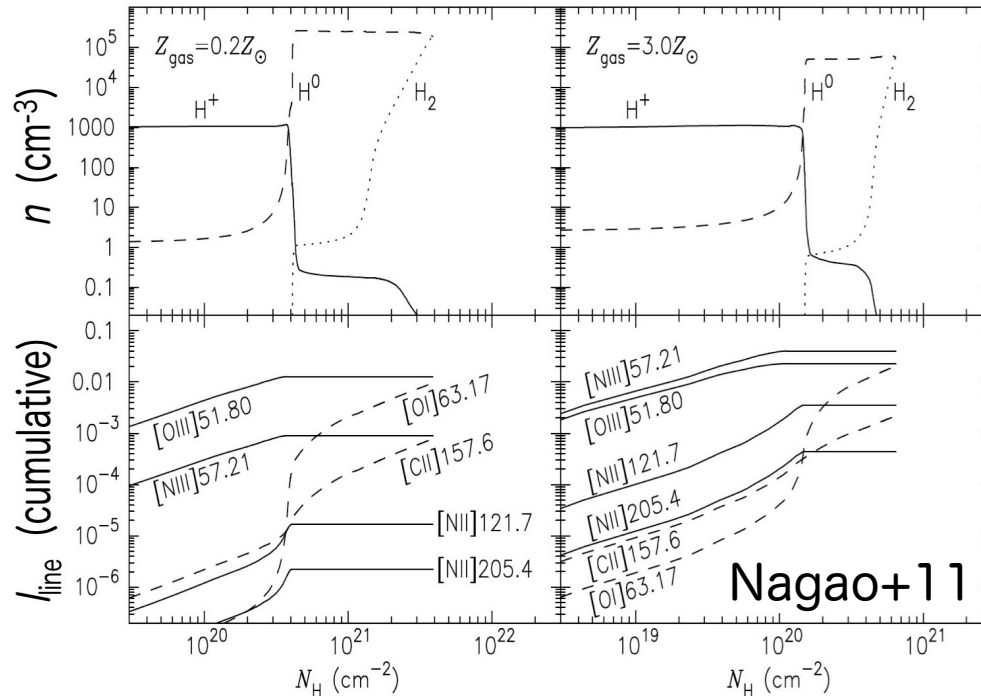
Serendipitous AGN detection with CO emission $\rightarrow z = 2.5$ or 3.6

3) Combining with the own new data



Giving constraints on the ISM ionization properties at high-z, by adding [NII] on the ALMA [CII] data


3) Combining with the own new data



3) Combining with the own new data



C-1

		TOHRU NAGAO		2013.1.00745.S	
PROJECT TITLE:		Assessing the nature of the ISM at high-z through multiple detections of fine-structure lines			
PRINCIPAL INVESTIGATOR NAME:		Tohru Nagao		PROJECT CODE: 2013.1.00745.S	
SCIENCE CATEGORY:		Cosmology and the High Redshift Universe	ESTIMATED 12M TIME:	7.1 h	ESTIMATED ACA TIME: 0.0 h
CO-PI NAME(S): (Large Proposals only)					
CO-INVESTIGATOR NAME(S):		Henry Cavendish, Lord Rayleigh, Joseph John Thomson, Lawrence Bragg, Arthur Compton, Brian Josephson, Martin Ryle, Antony Hewish			
EXECUTIVE SHARES[%]:		NA :	0	STUDENT PROJECT? (Yes/No)	
		EU :	0	No	
		EA :	100	RESUBMISSION? (Yes/No)	
		CL :	0	No	
		OTHER :	0		
ABSTRACT					
<p>The physical and chemical properties of the interstellar matter (ISM) redshift evolution are crucially important to understand the evolution of galaxies. Rest-frame optical diagnostics are not useful at $z > 3.5$ due to the limited NIR atmospheric transmission window, that prevents us from the quantitative assessment of the ISM in high-z galaxies. However, the sensitivity of ALMA enables us to observe some fine-structure lines at high redshifts, that can be used to study the nature of the ISM. Here we focus on a strong [CII] emitter, BR 1202-0725 at $z=4.69$. Thanks to its high [CII] luminosity and optimal redshift, we can observe [NII]122, [OI]145, and [NII]205</p>					

You can submit your ALMA proposal, based on the archival data !!



Summary

- ALMA archival data are quite useful
 - ~ but not for “target findings”
- Possible usages of the ALMA archive
 - ~ gathering many data → statistics
 - ~ new analysis for the archival data
 - ~ combining with the own new data
- Useful also for your ALMA proposals