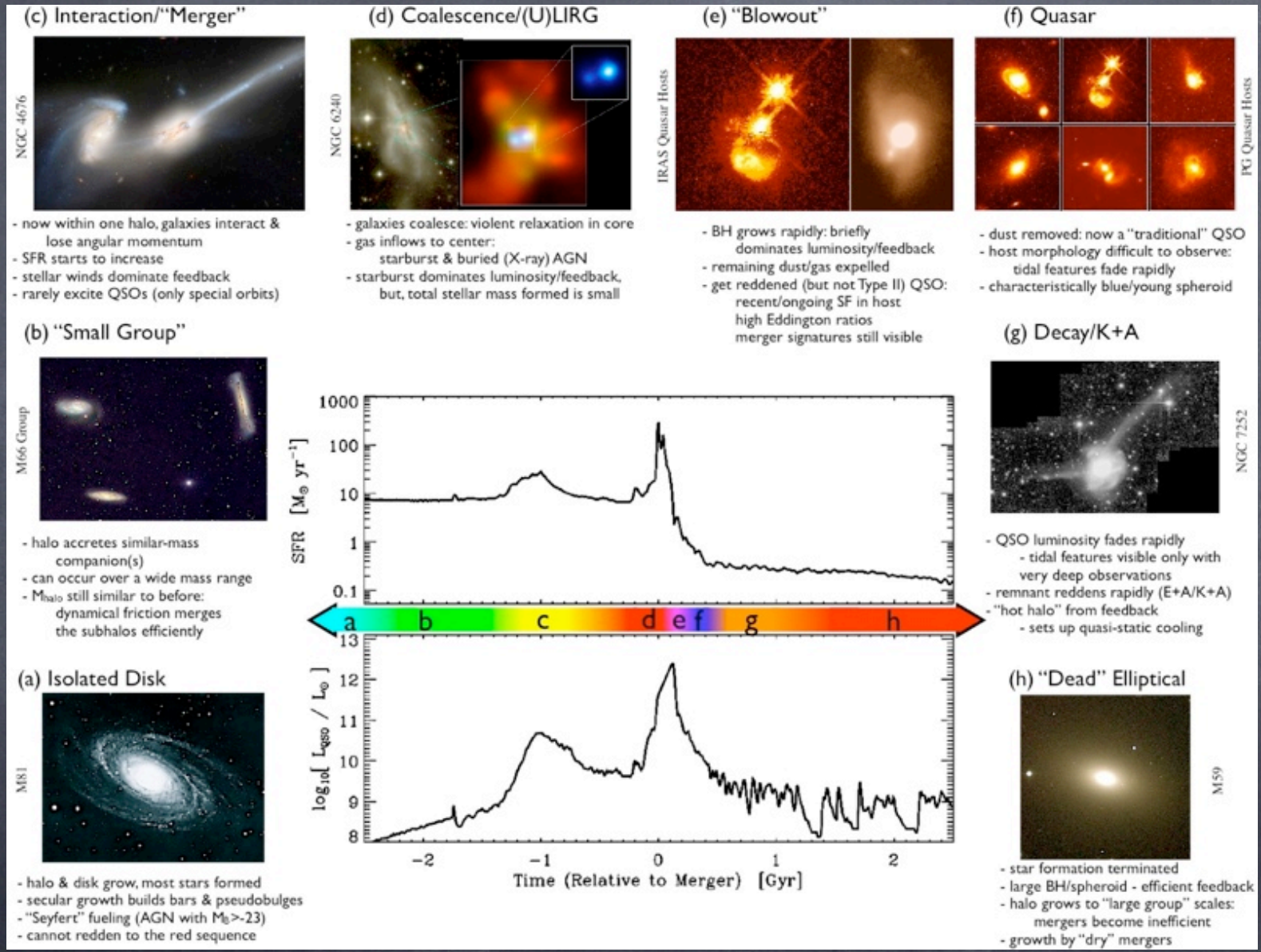
THE EXTRA-GALACTIC UNIVERSE AND ITS COSMOLOGY

HUGO MESSIAS

PORTUGUESE ALMA COMMUNITY DAY 2015

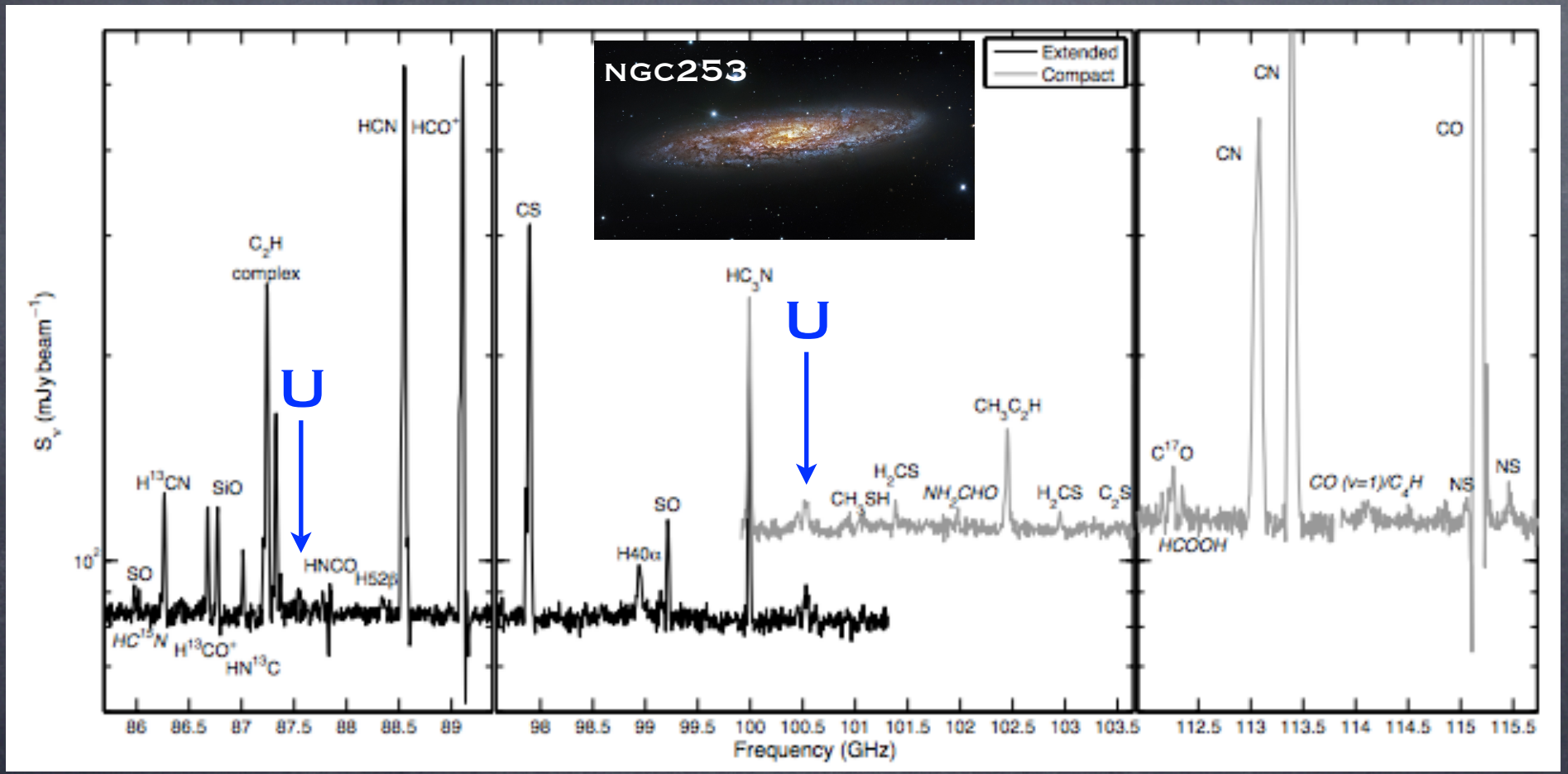
IA-LISBOA, 24TH FEBRUARY 2015



P. HOPKINS ET AL.(2008, FIG. 1)

alma can study all stages

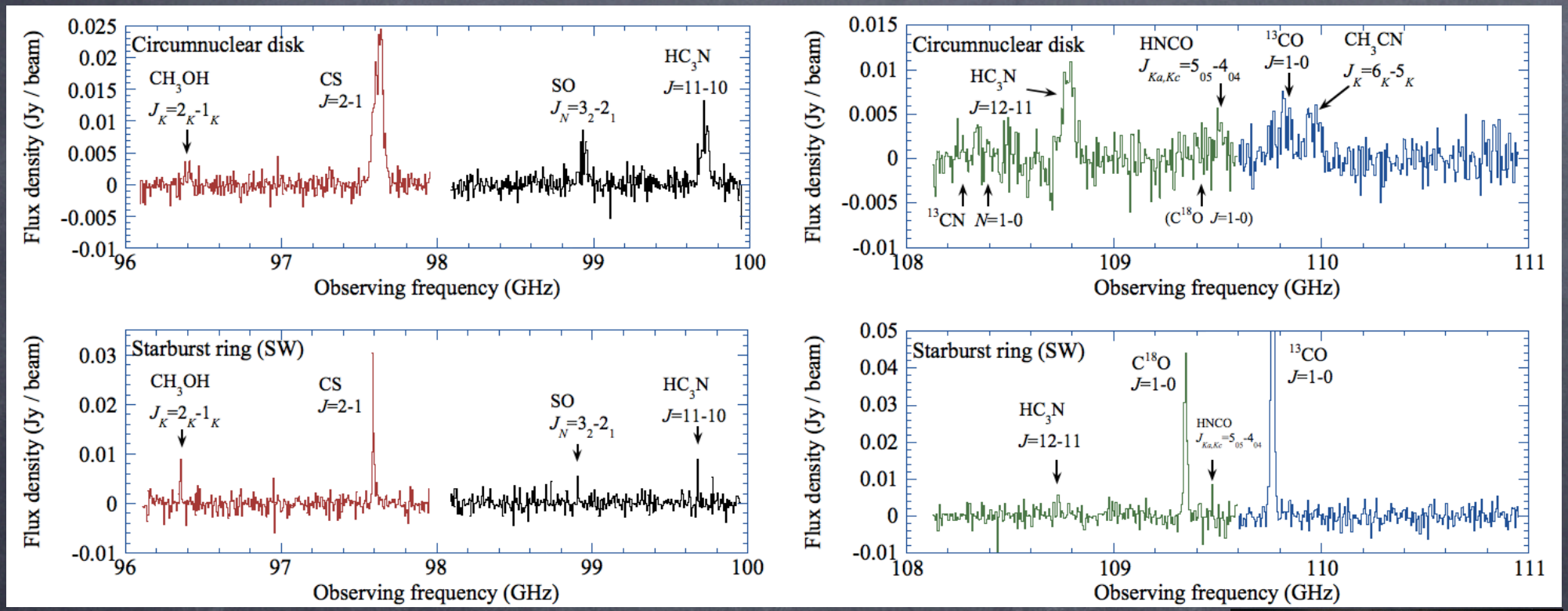
LOCAL UNIVERSE



MEIER ET AL. (2015, FIG.2)

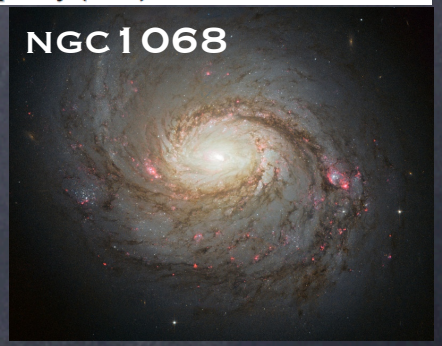
- spectral line detection
- unidentified species
- normalization real
- CycO

LOCAL UNIVERSE

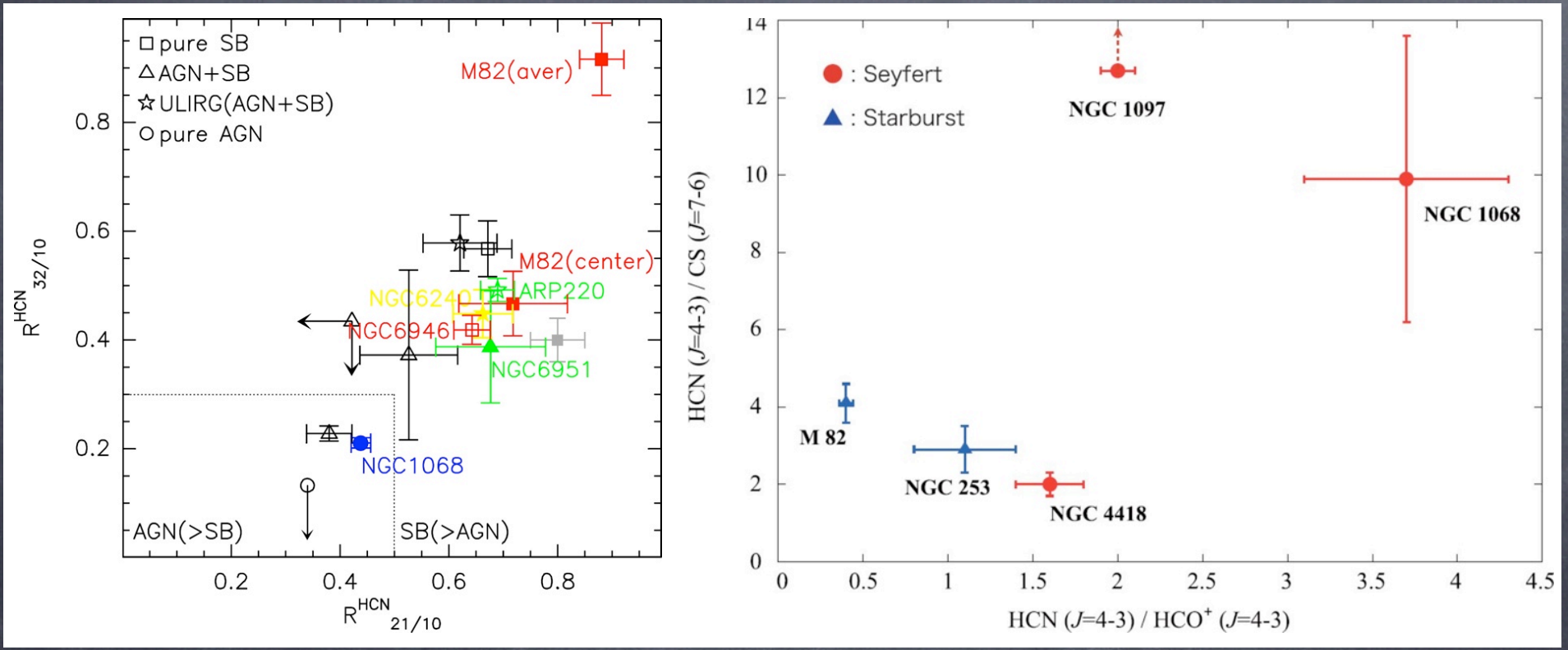


TAKANO ET AL. (2014, FIG.3)

spatially resolved spectroscopy Cyc0



LOCAL UNIVERSE

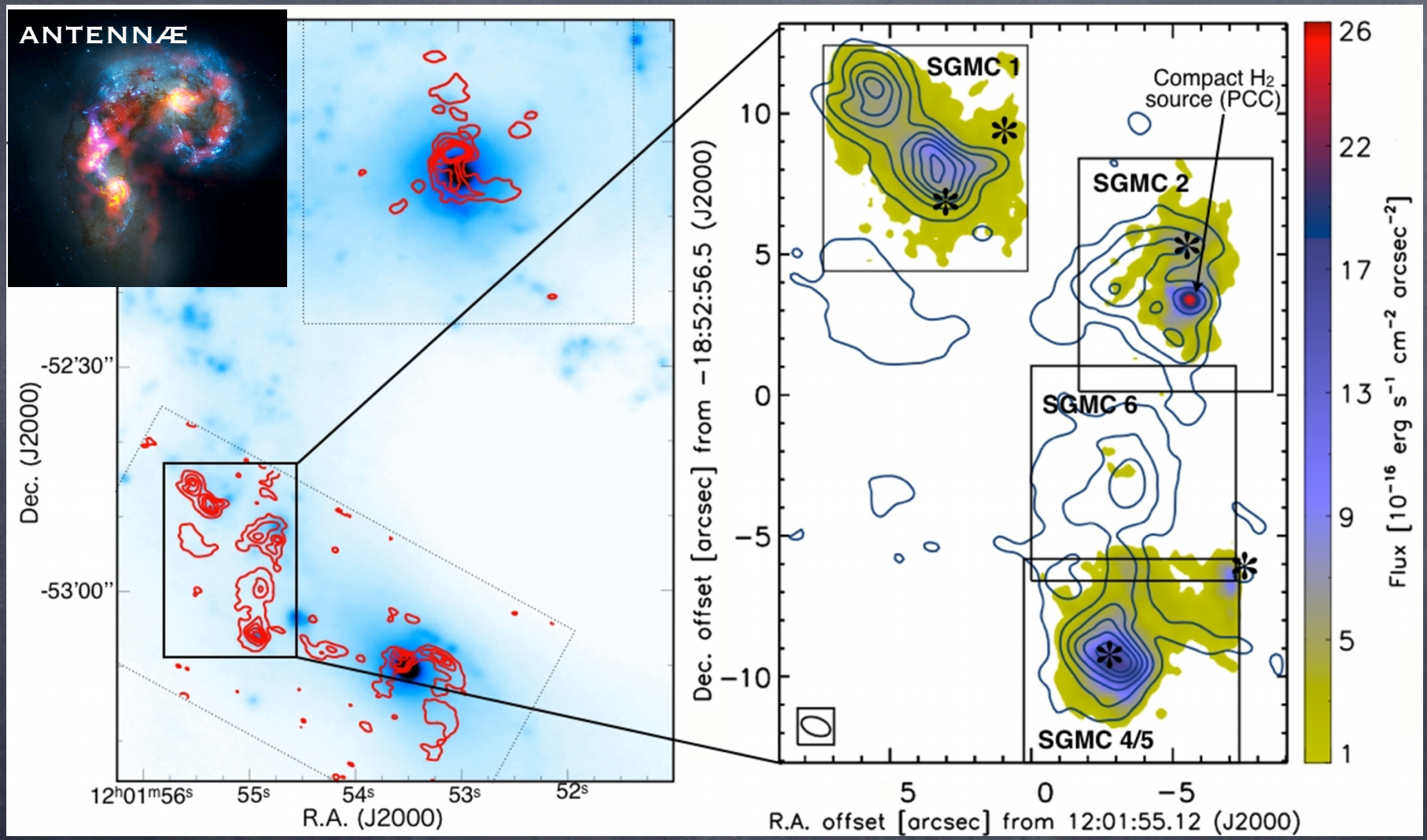


KRIPS ET AL. (2008, FIG. 3)
[SEE ALSO MEIJERINK ET AL. (2007)]

IZUMI ET AL. (2013, FIG. 11)

mm-bpt diagram
need for spatial
resolution though
Izumi, Cyc0, B7

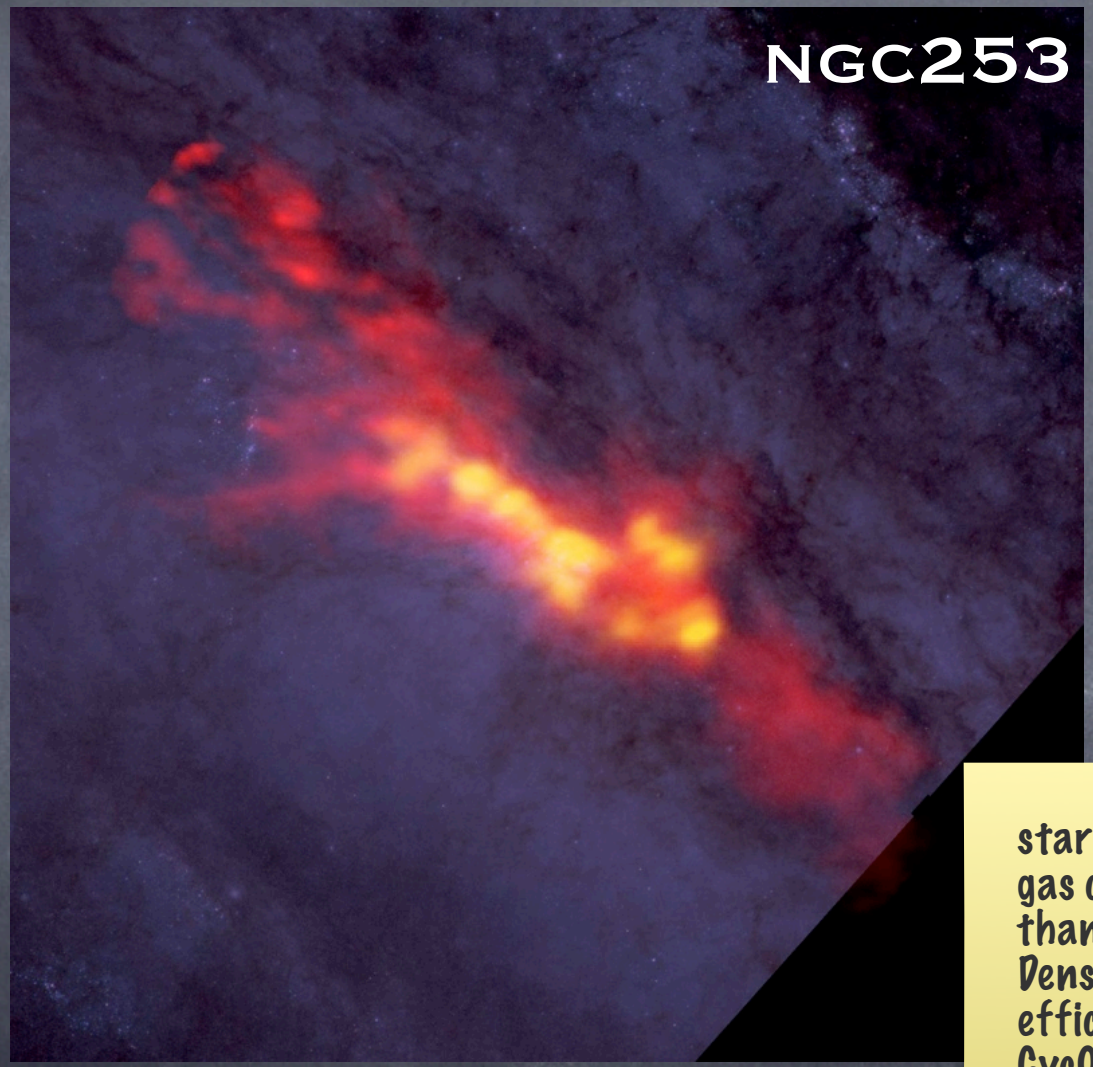
LOCAL UNIVERSE



HERRERA ET AL. (2012, FIG.1)

- spatial resolution
- comparison to H2
- SciVerif

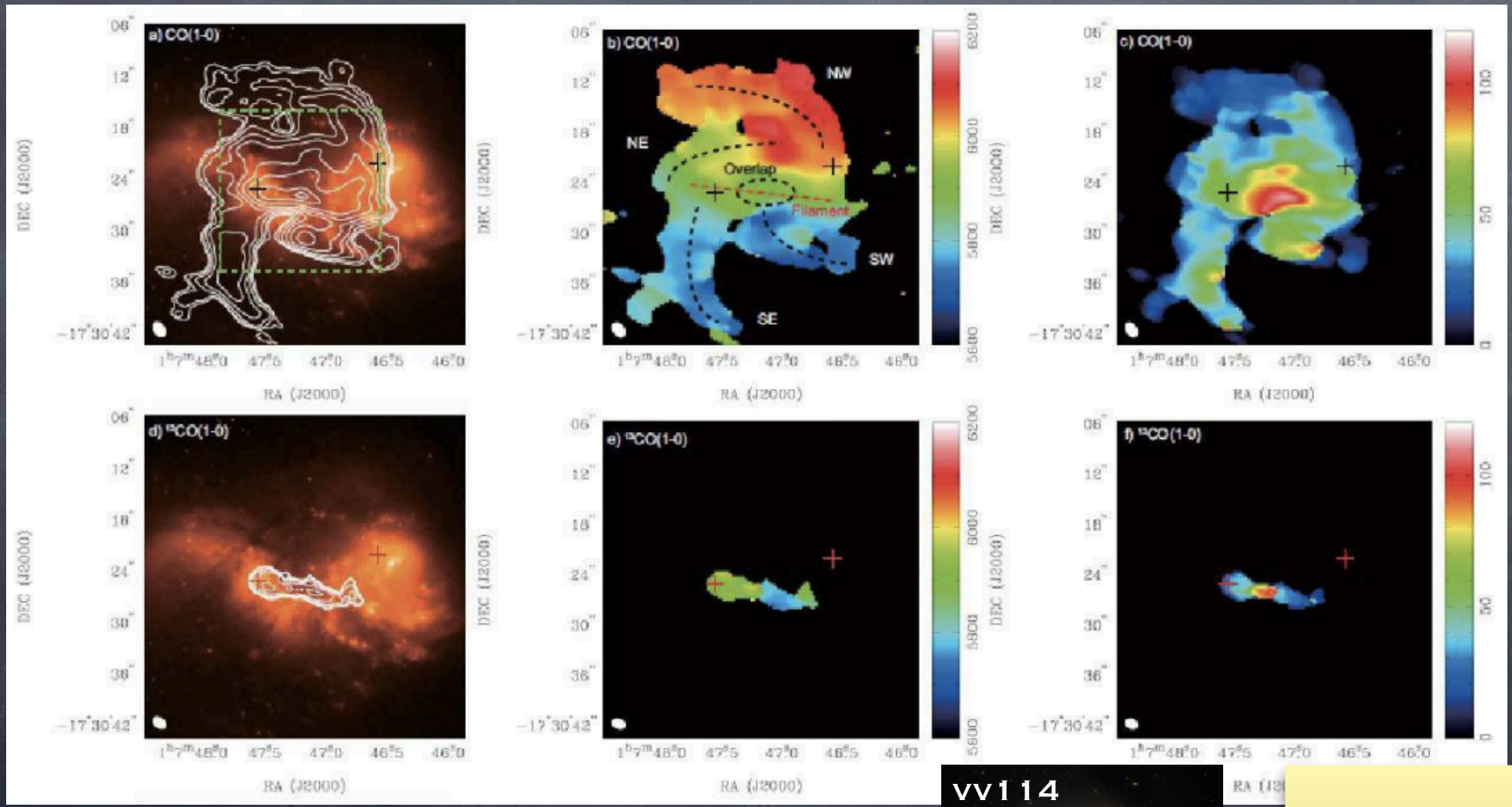
LOCAL UNIVERSE



LEROY ET AL. (2015, PRESS RELEASE)

star formation efficiency
gas consumption 10x faster than in disc
Density is key setting efficiency
Cyc0&1

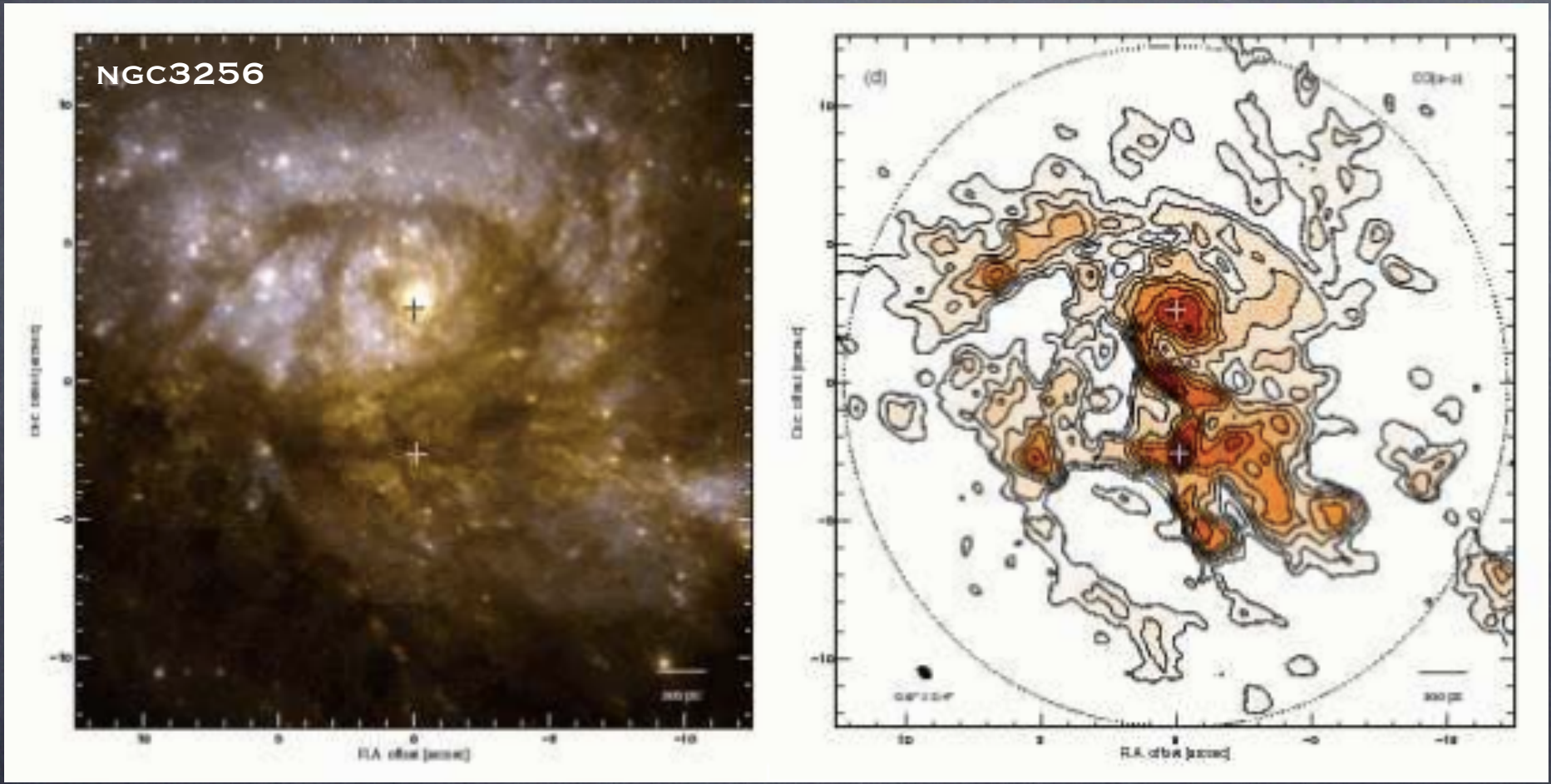
LOCAL UNIVERSE



SAITO ET AL. (2015, FIG.2)

- dynamics
- tidal tail
- isotope
- 40min CycO

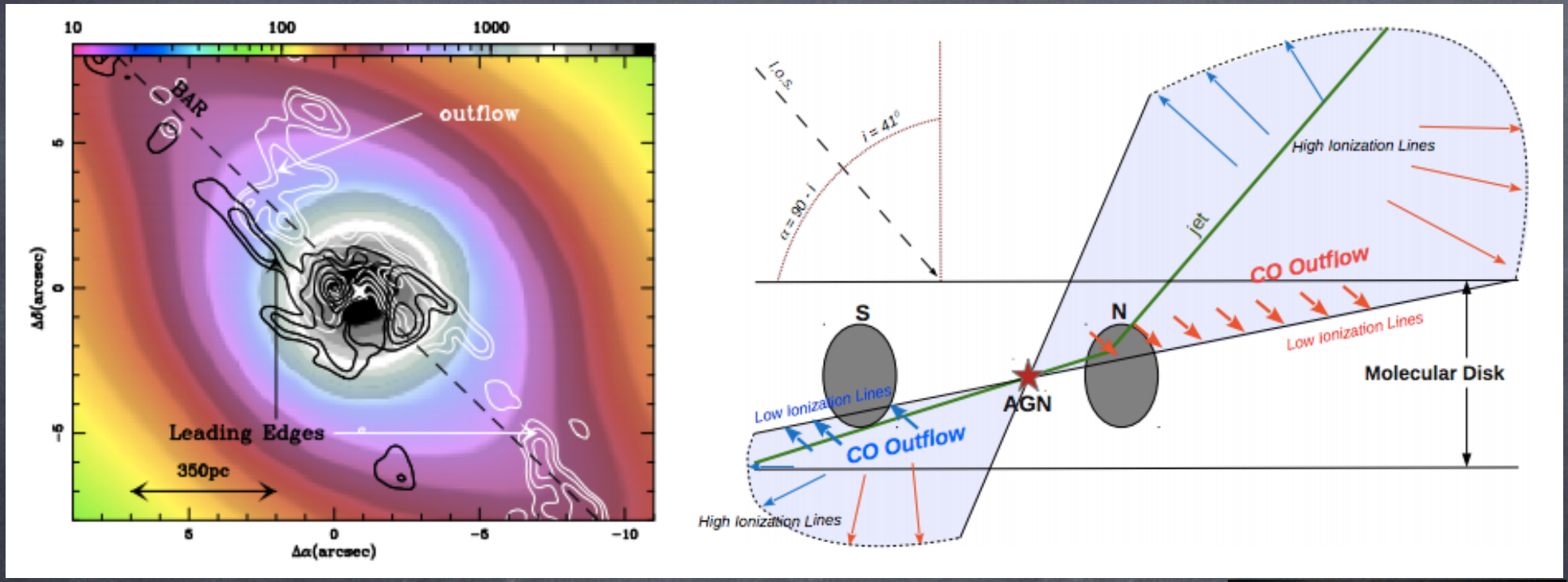
LOCAL UNIVERSE



SAKAMOTO ET AL. (2014, FIG.18)

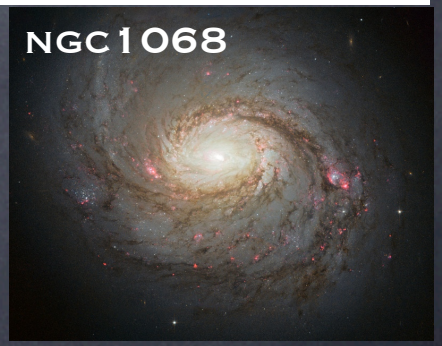
- outflows: star-formation plus agn
- sciVer+CO, B7, 2x3h

LOCAL UNIVERSE



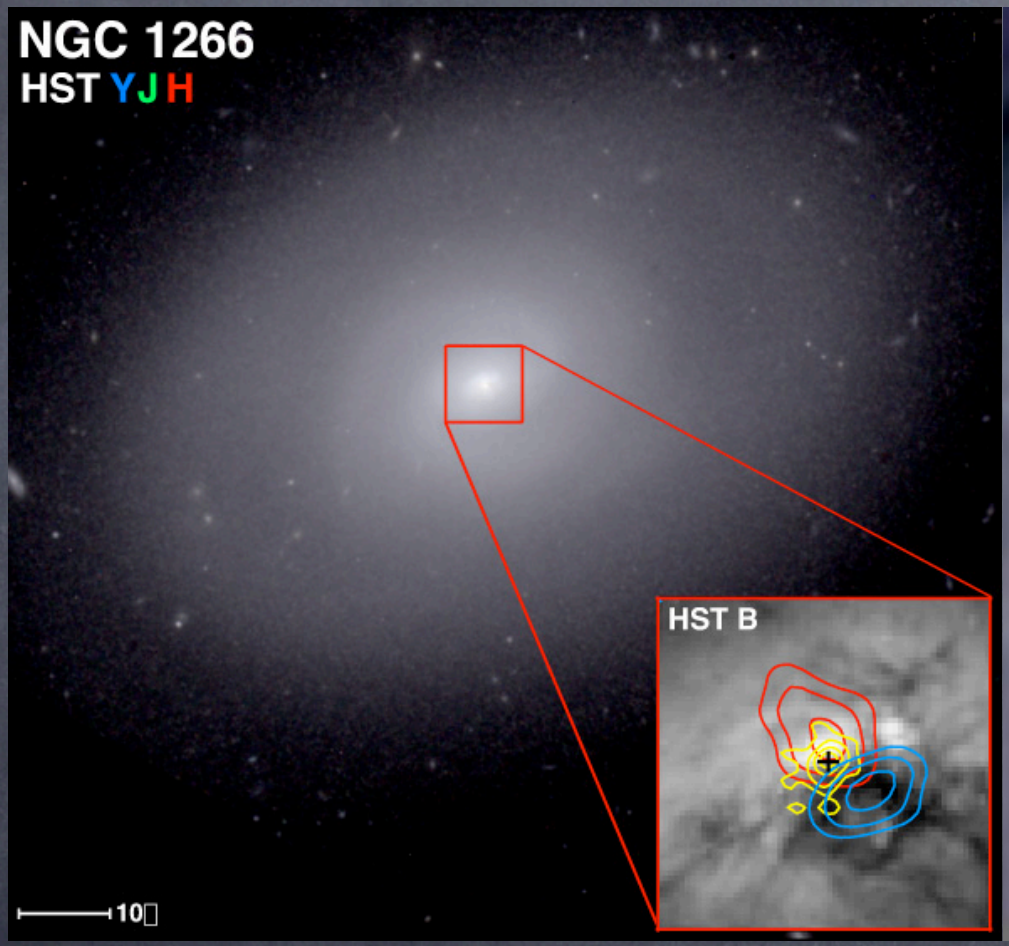
García-Burillo et al. 2014, figs. 5 and 17)

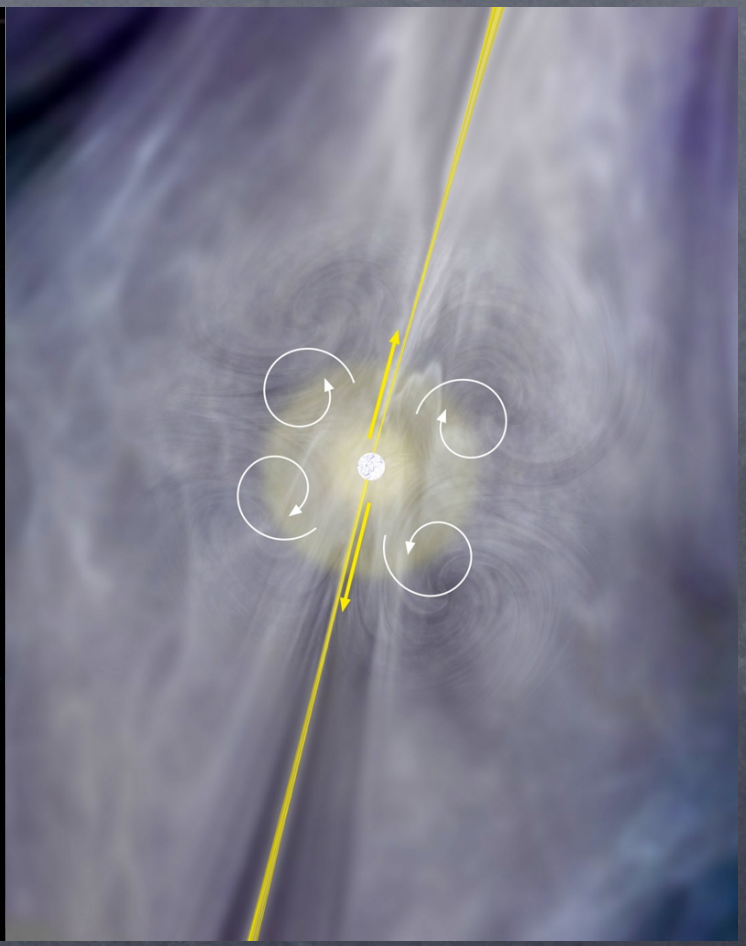
NGC1068



outflows
- B7+9, Cyc0
- 30min/track
(138tot)

LOCAL UNIVERSE

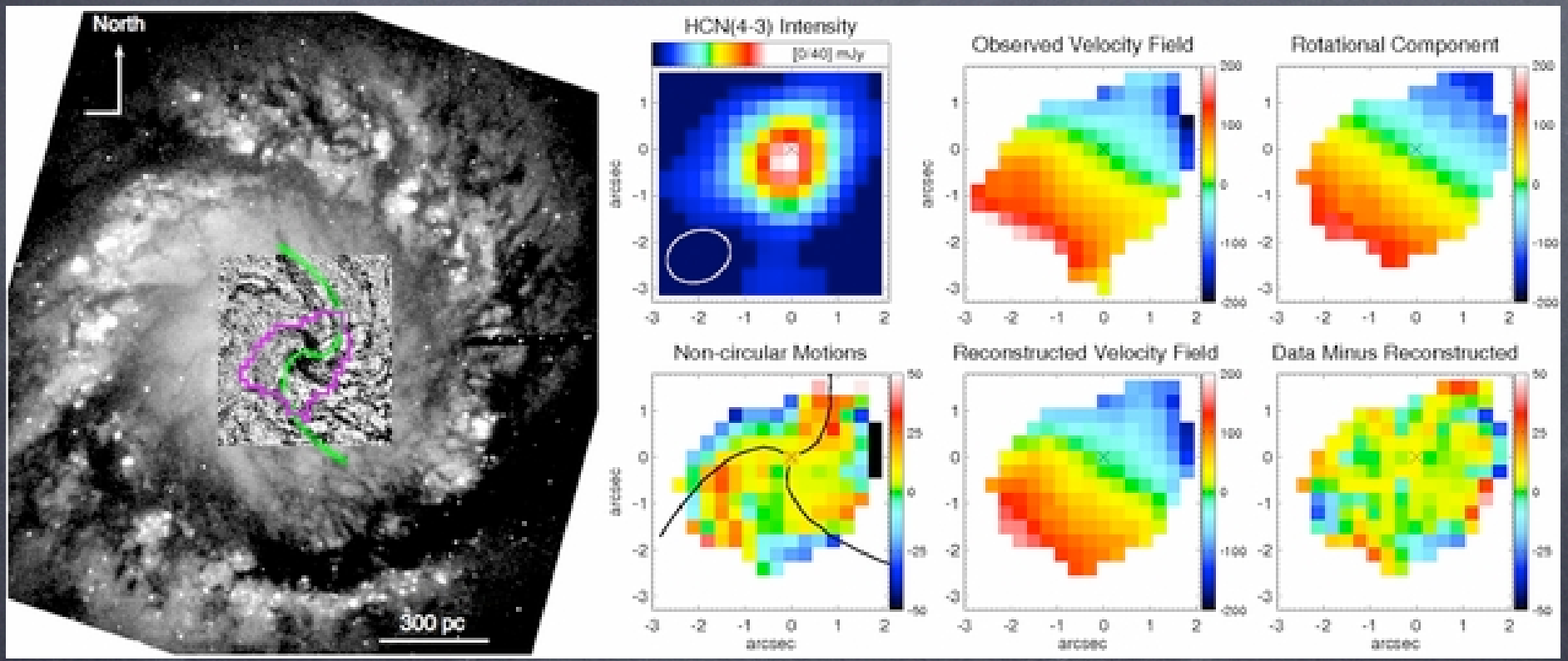




ALATALO ET AL. (2015, PRESS RELEASE)

outflows
also CARMA
too much gas for the SFR
too much turbulence
CycO

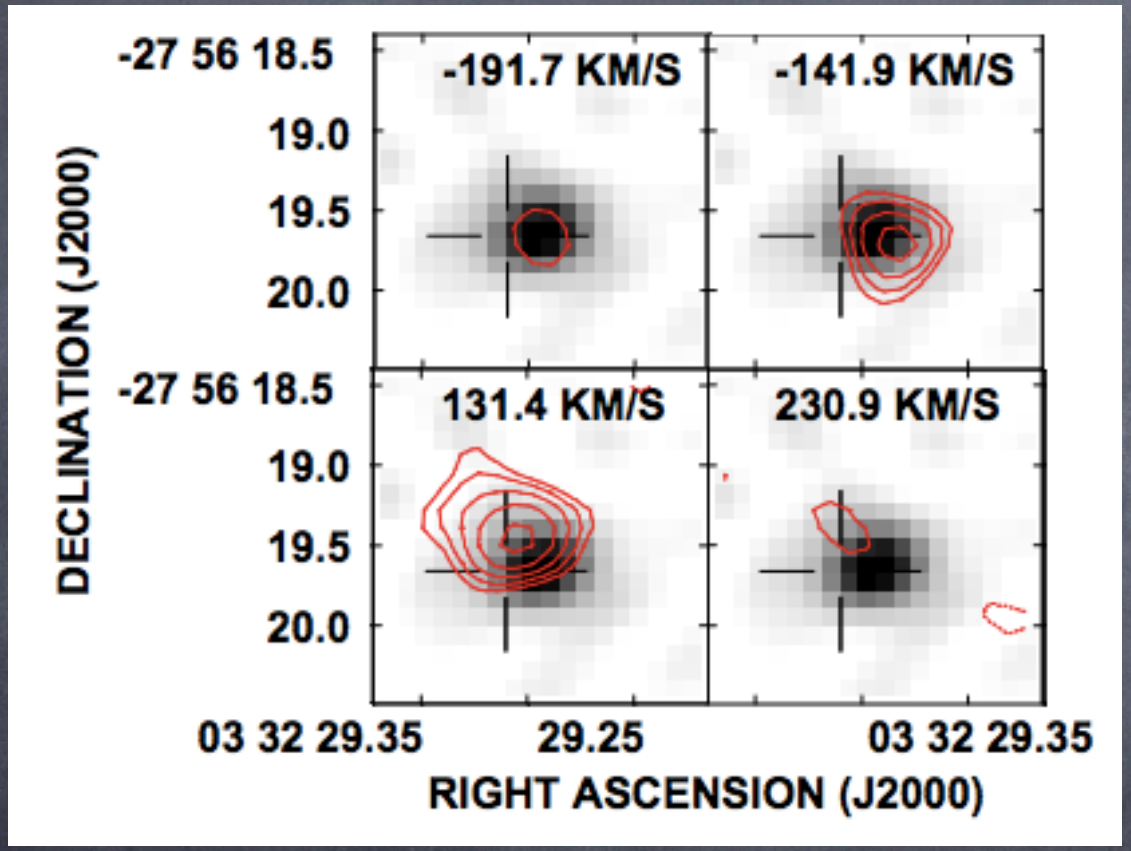
LOCAL UNIVERSE



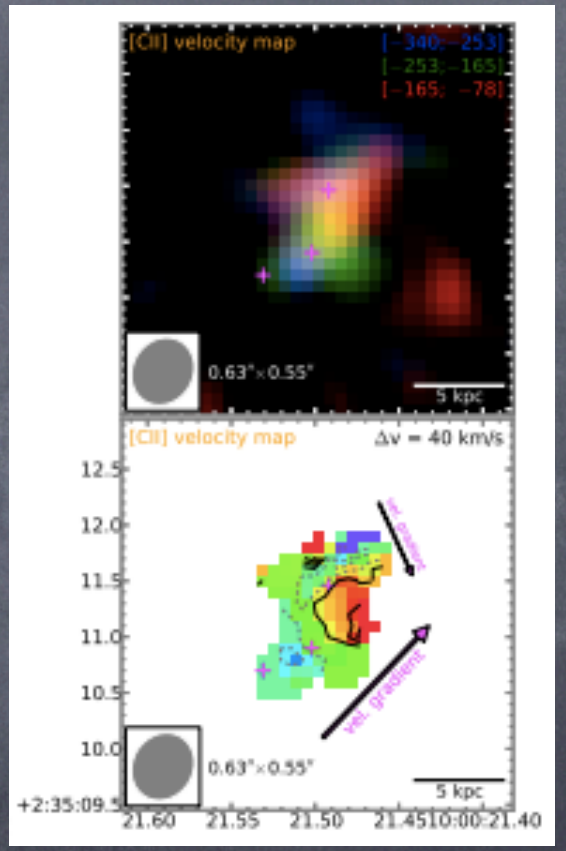
FATHI ET AL. (2013, FIG. 1)
[WAIT ALSO FOR TREMBLAY ET AL. (ABELL 2597)]

inflow gas
Cyc0

HIGH-Z UNIVERSE



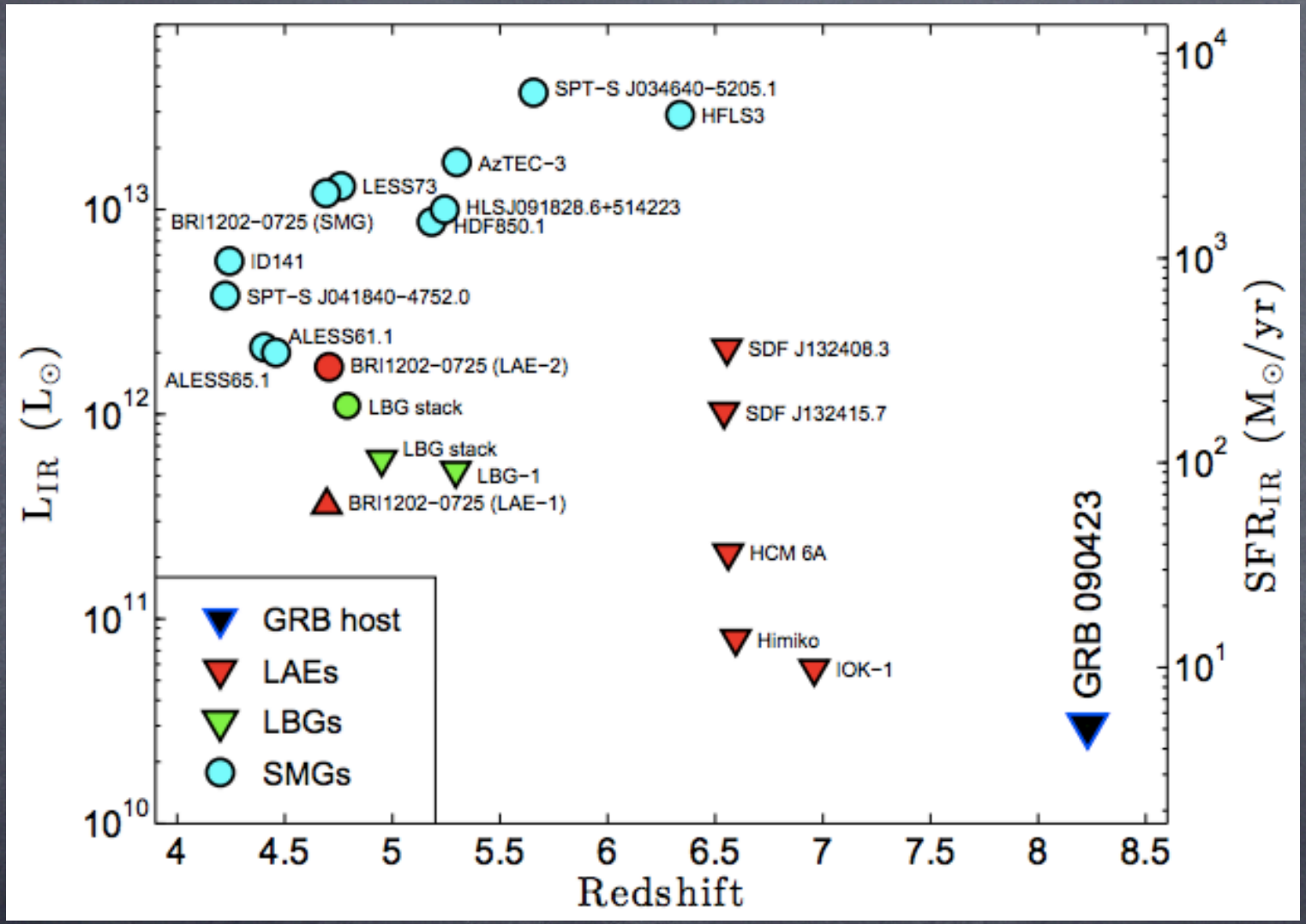
DE BREUCK ET AL. (2014, FIG. 3)



RIECHERS ET AL. (2014, FIG. 7)

cii dynamics, z~4—5
CycO, B7
Riechers, 125min

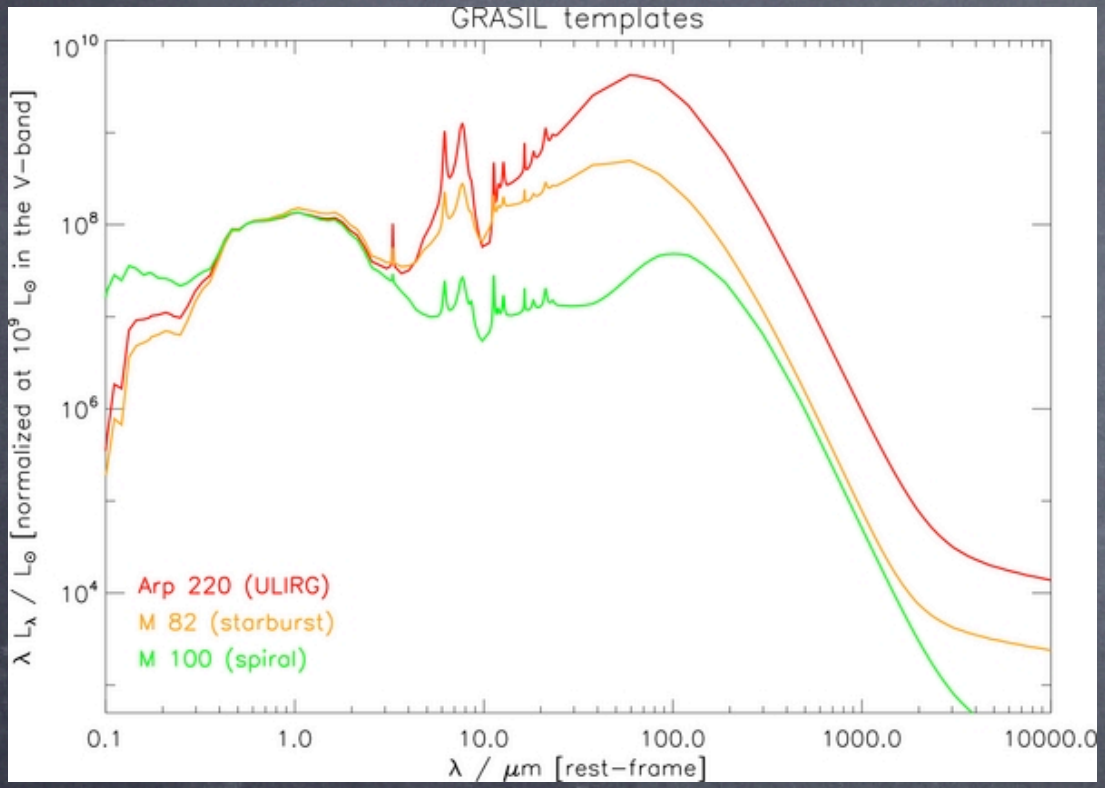
HIGH-Z UNIVERSE



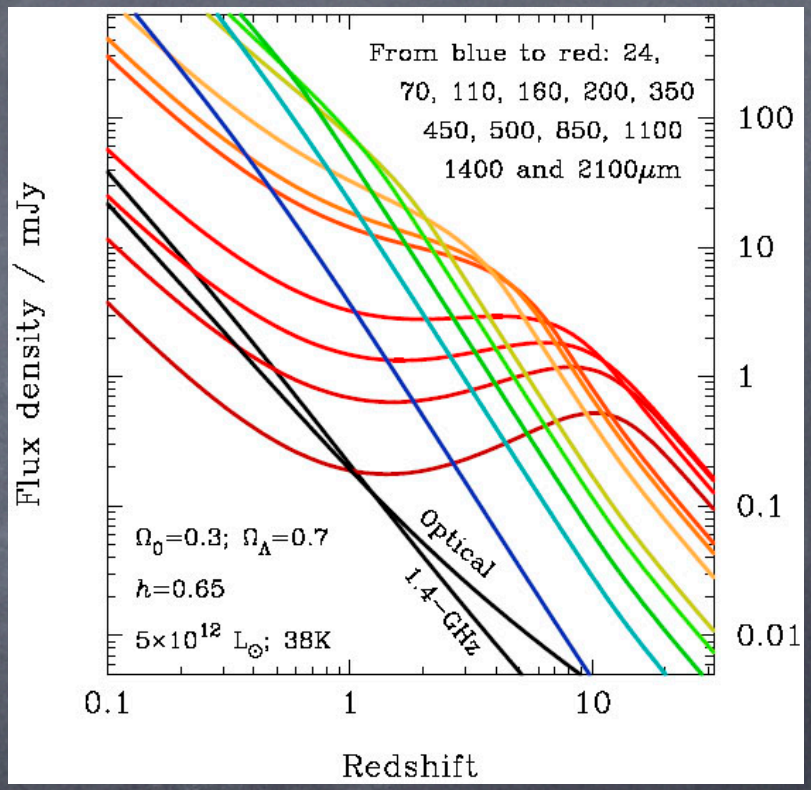
BERGER ET AL. (2014, FIG. 3)
[BUT WAIT FOR D. WATSON ET AL. (2015, NATURE, A1689-ZD1, z=7.5]

high-z continuum detection
GRB Cycl, B6, 163min

HIGH-Z UNIVERSE



DA CUNHA ET AL. (2013, FIG. 12)



BLAIN ET AL. (2002, FIG. 4)

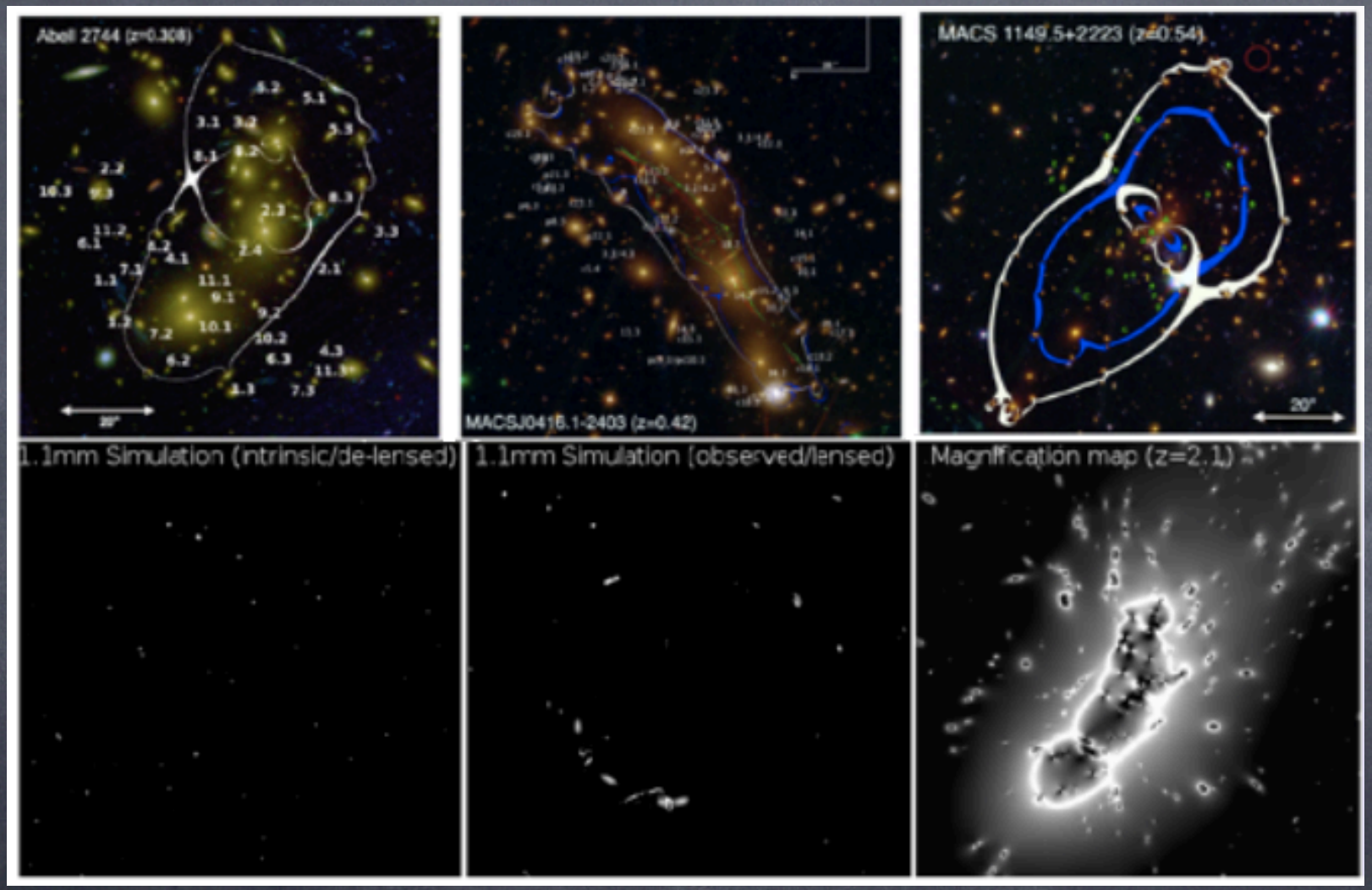
k-correction
mm high-z bias

HIGH-Z UNIVERSE

- An ALMA 1.3-mm image of The Hubble Ultra Deep Field [PI James Dunlop]
- Mining and resolving a contiguous 1.5 arcmin^2 window in the SXDF-CANDELS-UDS at 1.1 mm with ALMA [PI Kotaro Kohno]
- A Molecular ALMA Deep Field in the UDF [PI Fabian Walter]
- Unveiling the population of high-redshift submillimeter galaxies with ALMA 1.2 mm imaging [PI Manuel Aravena]
- An ALMA 1.3 mm spectroscopic survey in the Hubble Ultra Deep Field [PI Manuel Aravena]
- Lensing Through Cosmic Time: ALMA Constraints on "Normal" Galaxies in the HST Frontier Fields [PI Franz Bauer]
- Evolution of ISM in Star-Forming Galaxies at z = 1 - 5 [PI Nick Scoville]

many deep fields
mm bias high-z
goal continuum detect
normal galaxies

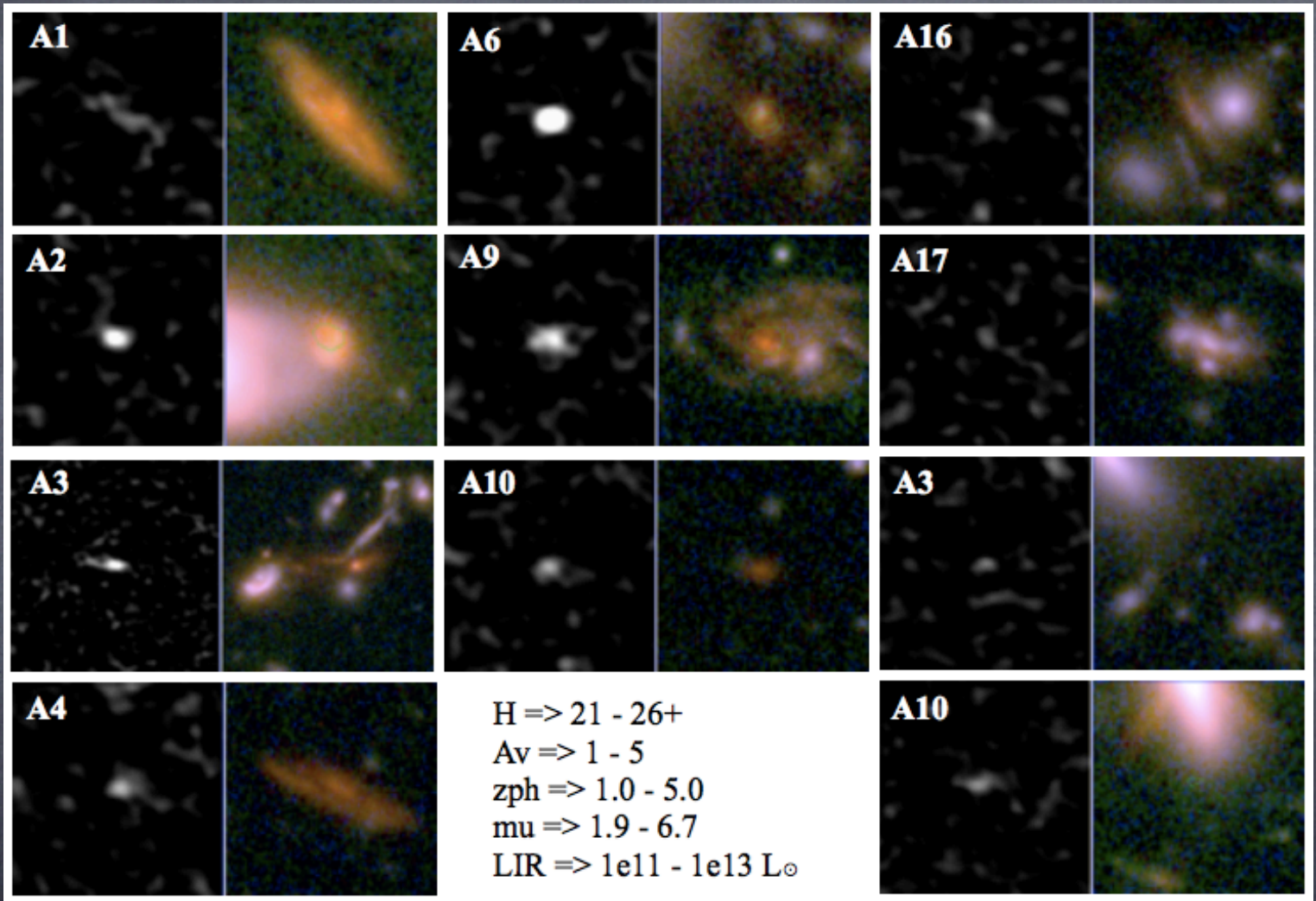
HIGH-Z UNIVERSE



PI F. BAUER — LENSING THROUGH COSMIC TIME

k-corr + lensing

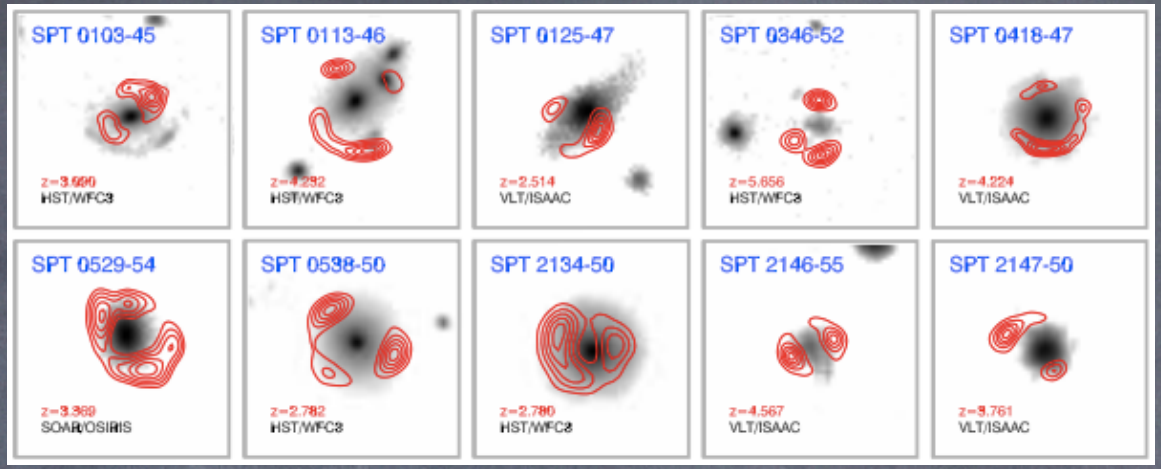
HIGH-Z UNIVERSE



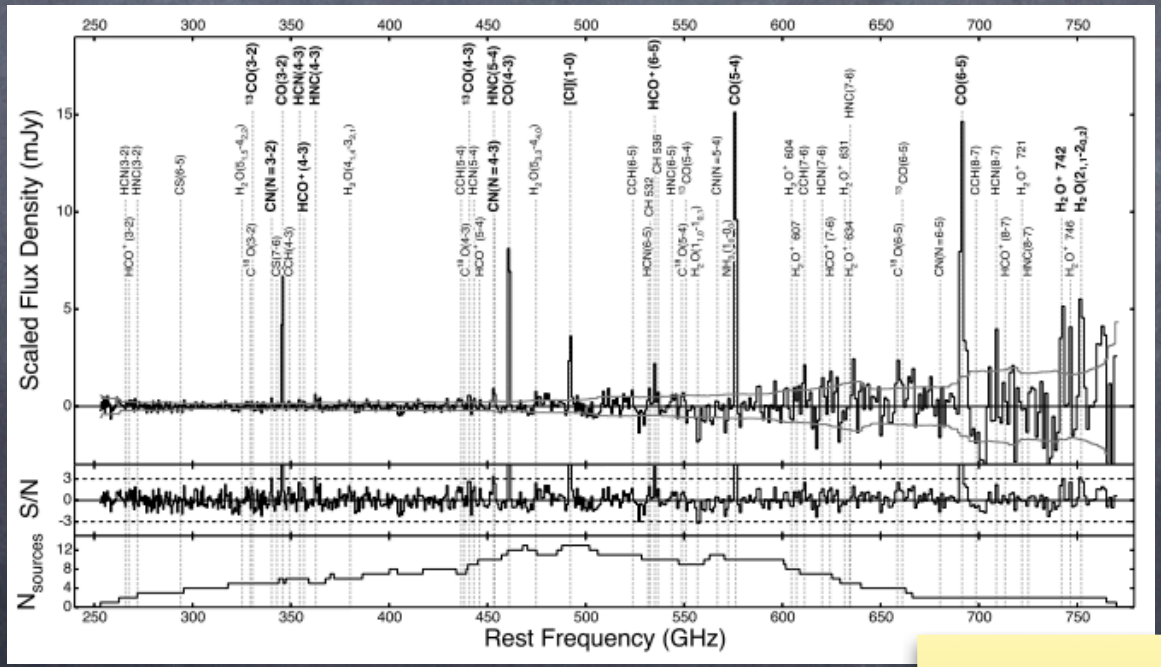
PI F. BAUER — LENSING THROUGH COSMIC TIME

k-corr + lensing
detections
3-4min/ptg, 2.4-3h

HIGH-Z UNIVERSE



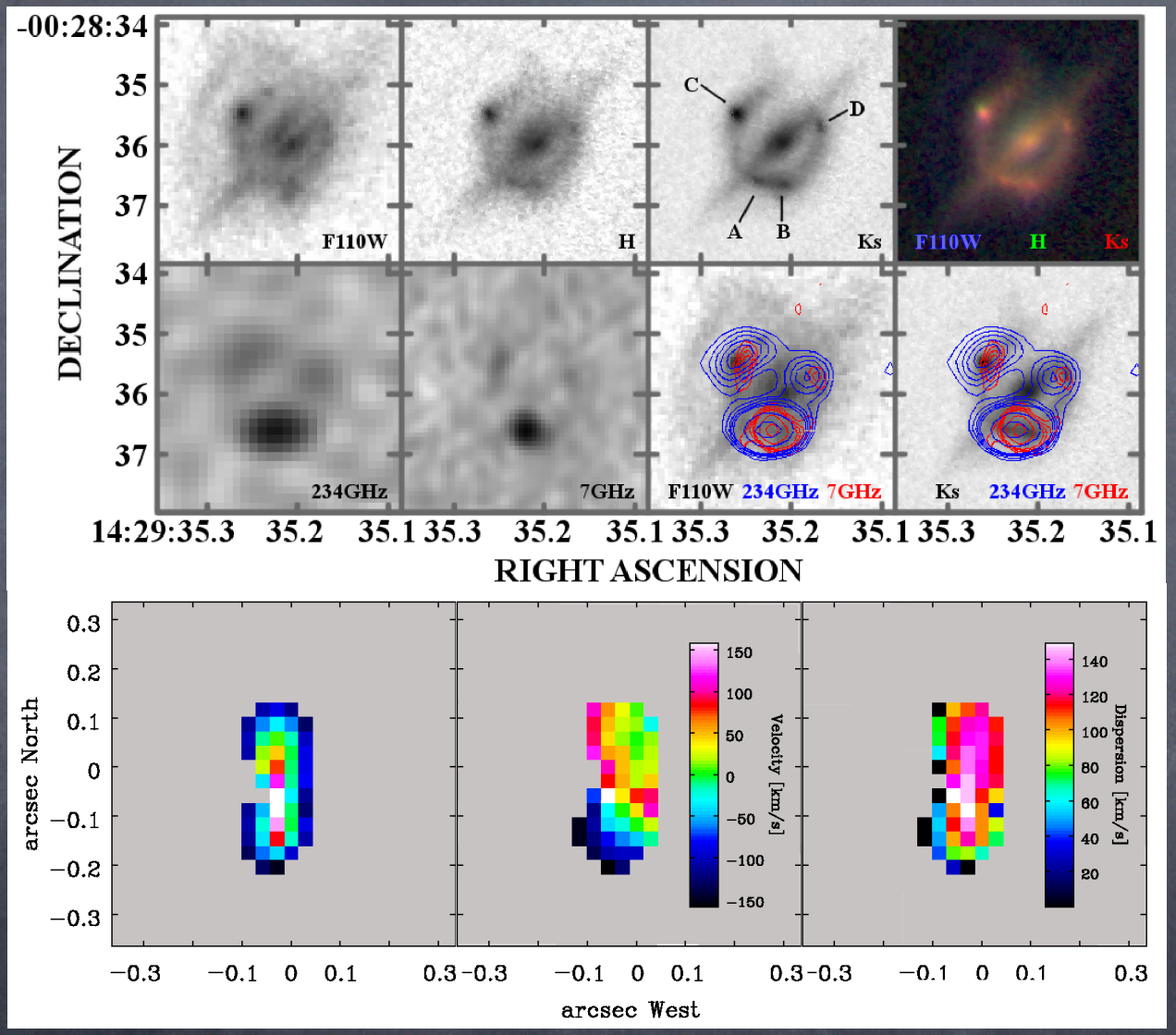
VIEIRA ET AL. (2013, FIG. 1)



SPILKER ET AL. (2014, FIG. 2)

spt sample
spec detection
Cyc0, ~12min

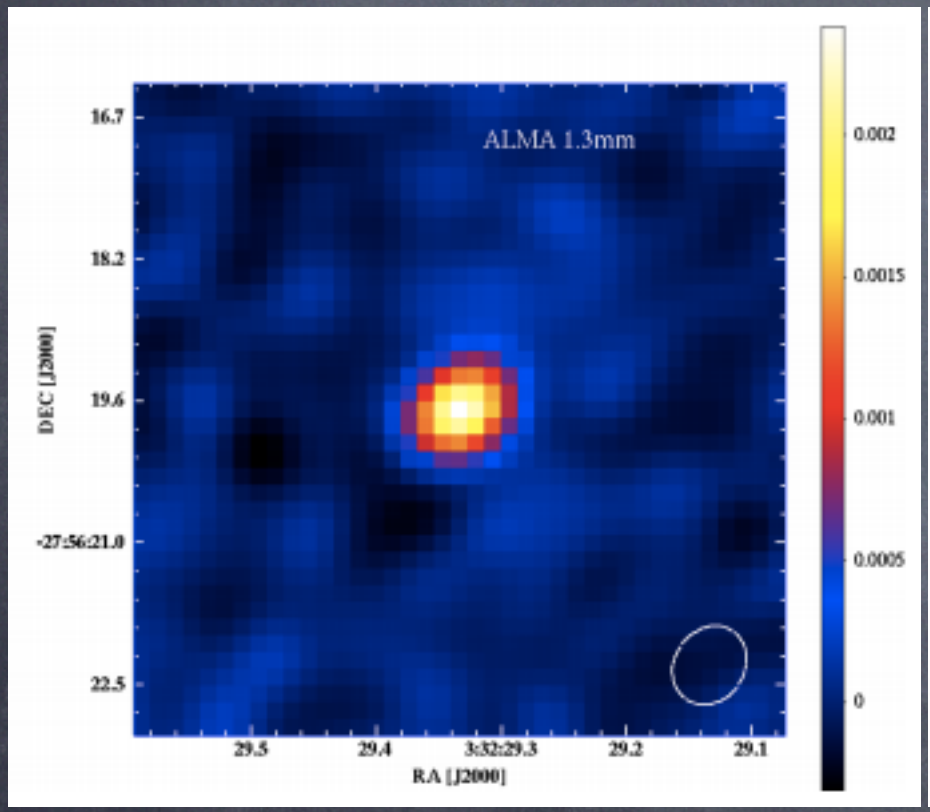
HIGH-Z UNIVERSE



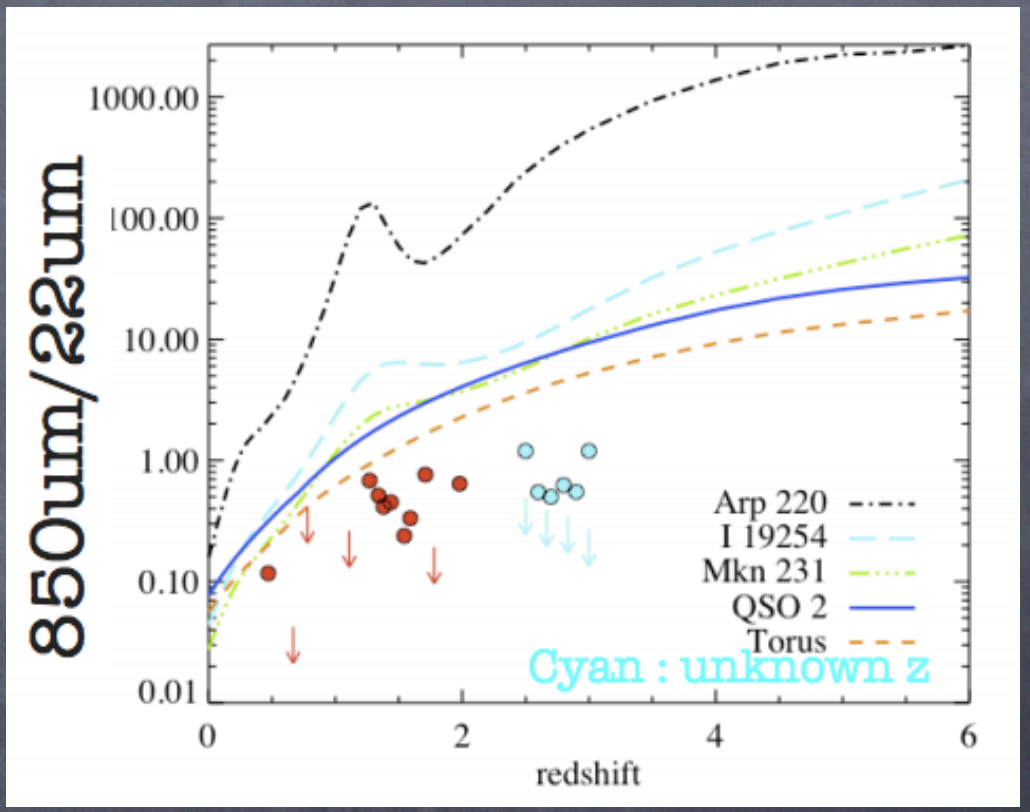
MESSIAS ET AL. (2014B, FIG. 1 AND 10)

lensed dynamics
Cyc0, 30min

HIGH-Z UNIVERSE



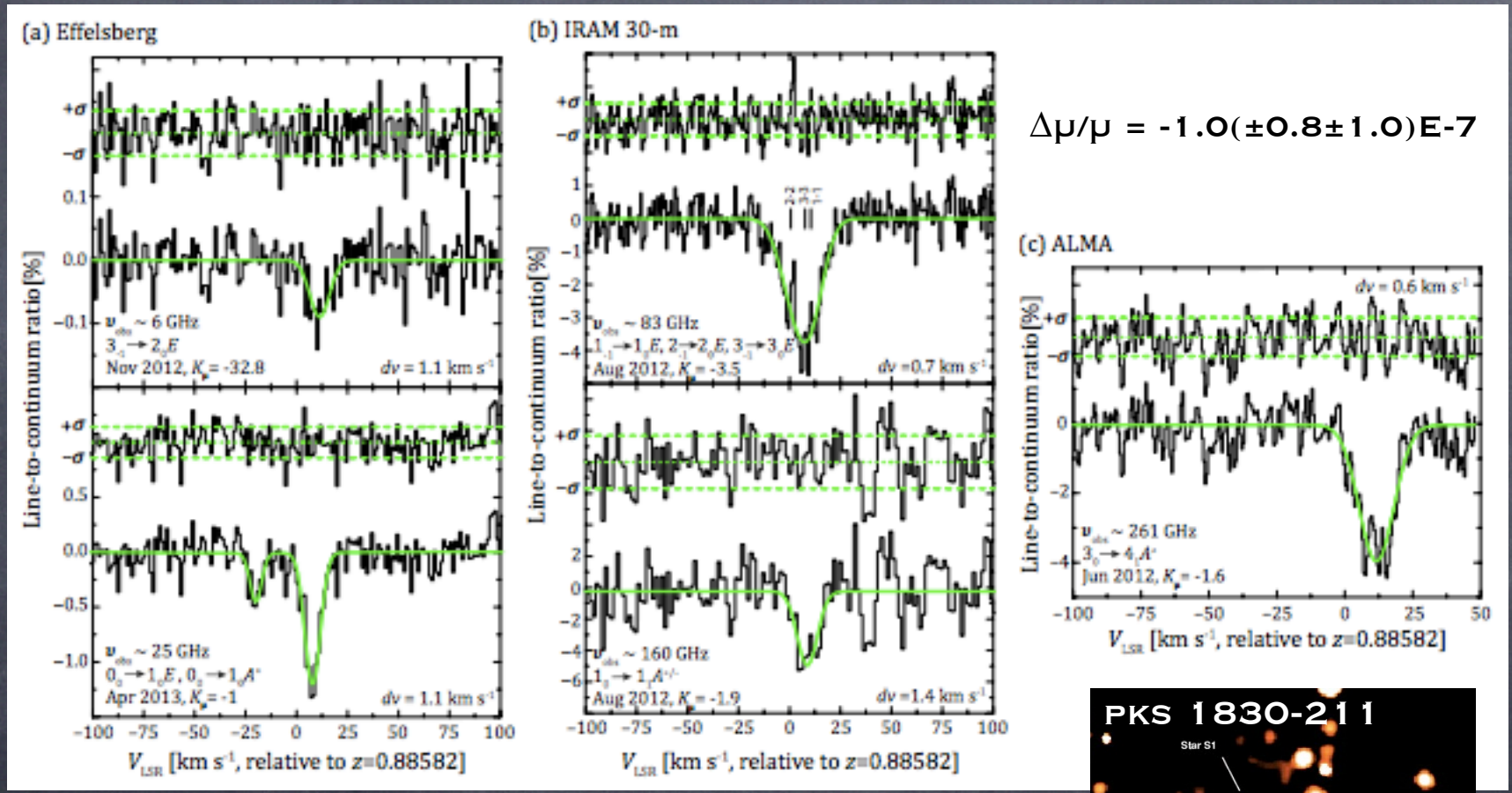
GILLI ET AL. (2014, FIG. 1)



PI C. LONSDALE — NVSS-WISE AGN

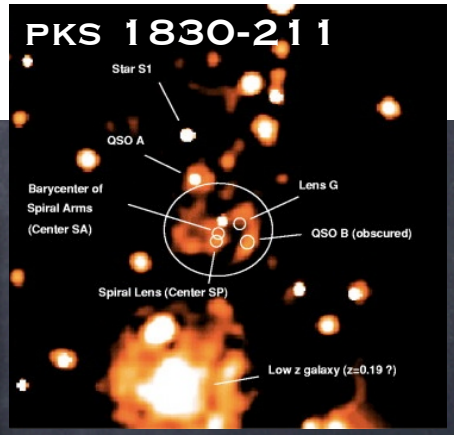
agn hosts
- G14 host column density = x-ray Nh, no need pc-absorber
- general agn dominance (c.lonsdale)
- Cyc0, B6, 3min (Gilli)

COSMOLOGY



BAGDONAITE ET AL. (2013, FIG. 1)

$\Delta\mu/\mu$ = -1.0(±0.8±1.0)E-7



proton-electron mass ratio toward pks1830
Null result
Cyc0

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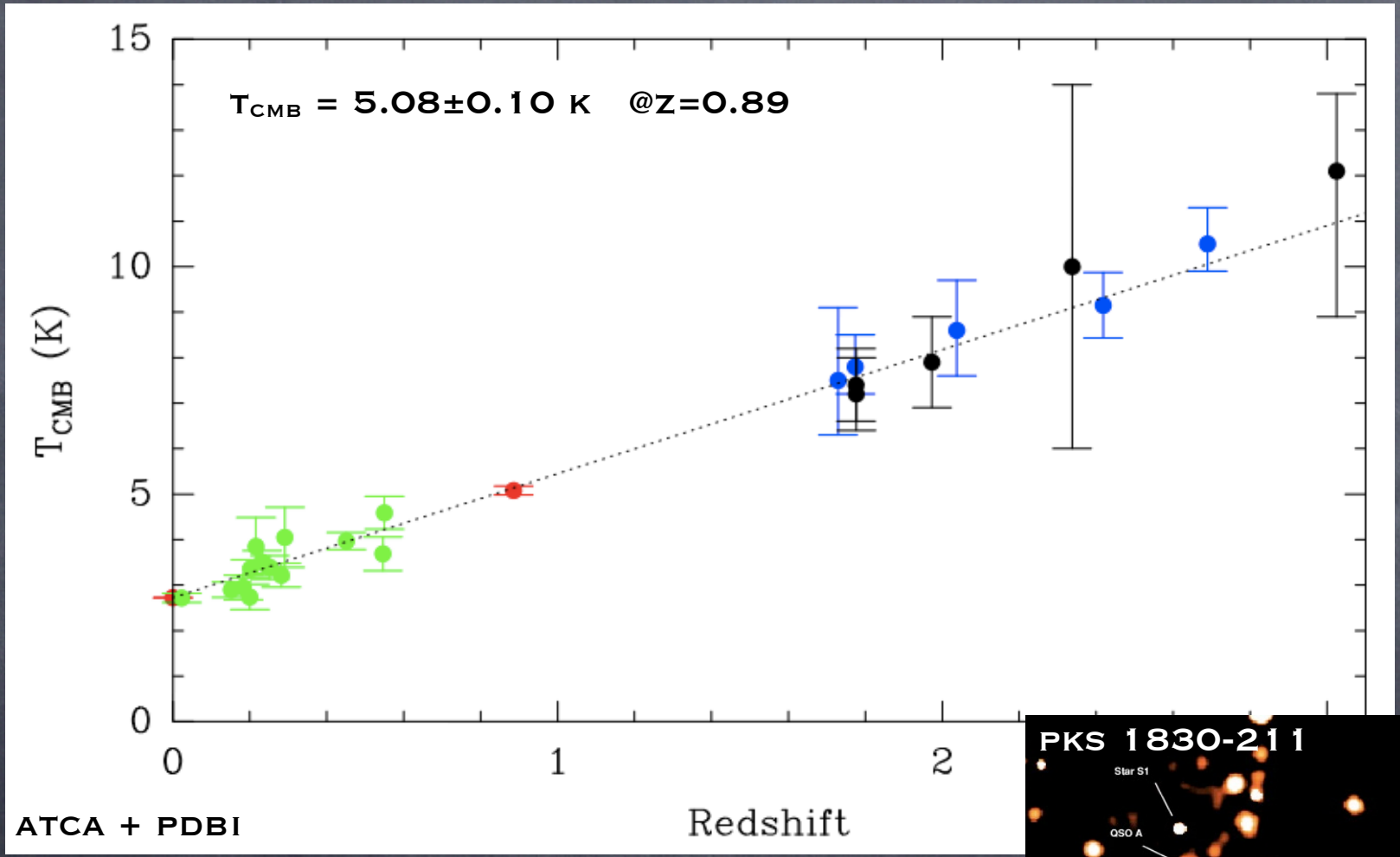
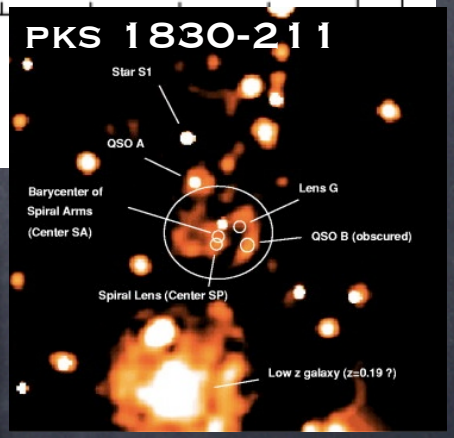
THE X-GAL UNIVERSE AND ITS COSMOLOG

COSMOLOGY

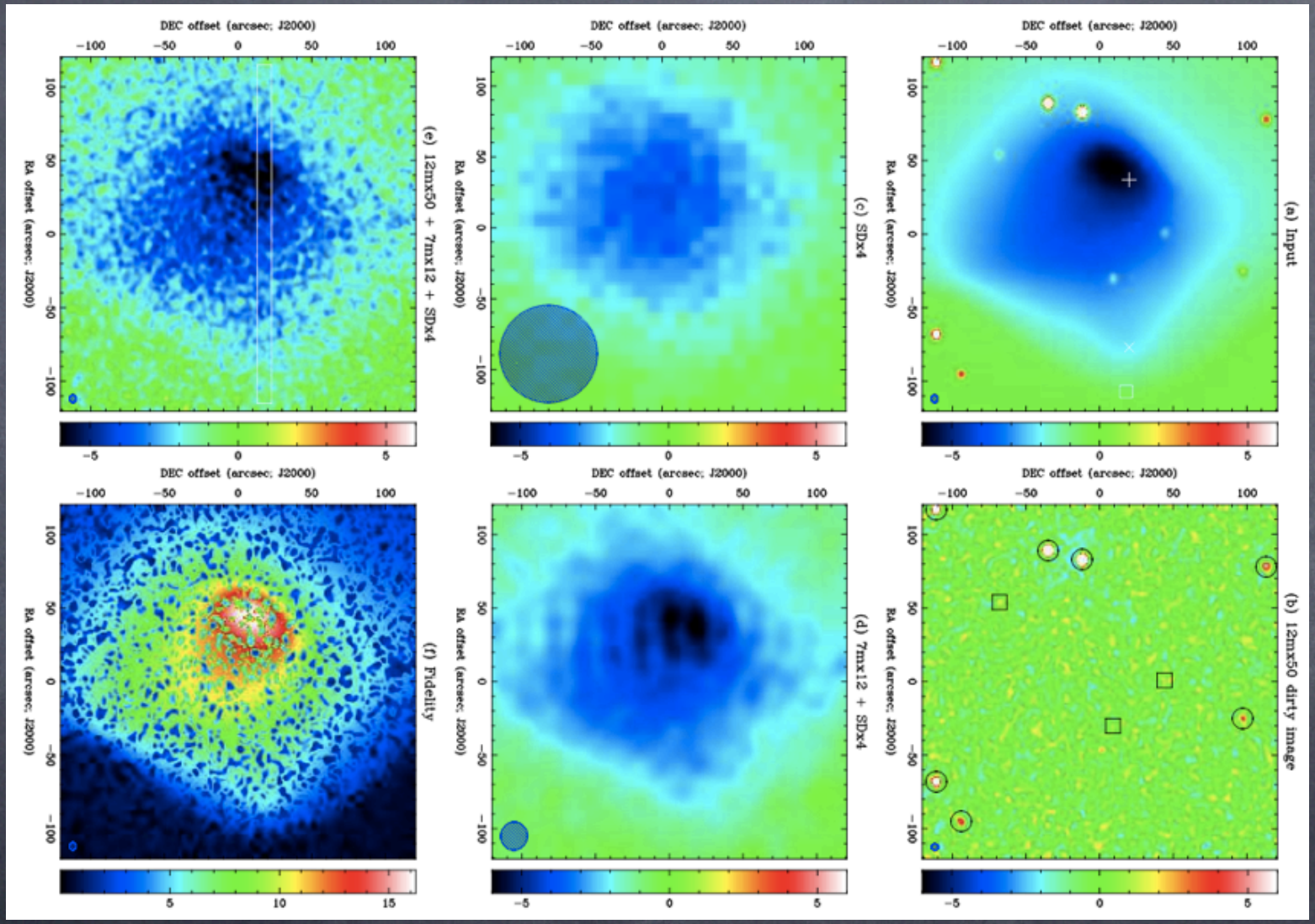


MULLER ET AL. (2012, FIG. 5)



tcmb toward pks1830
adiabatic expantion
atca+pdbi

COSMOLOGY



YAMADA, KITAYAMA, ET AL. (2012, FIG. 5, SIMULATION)

thermal sz effect
10h(12m), 40h(7m,TP)

THANK YOU!