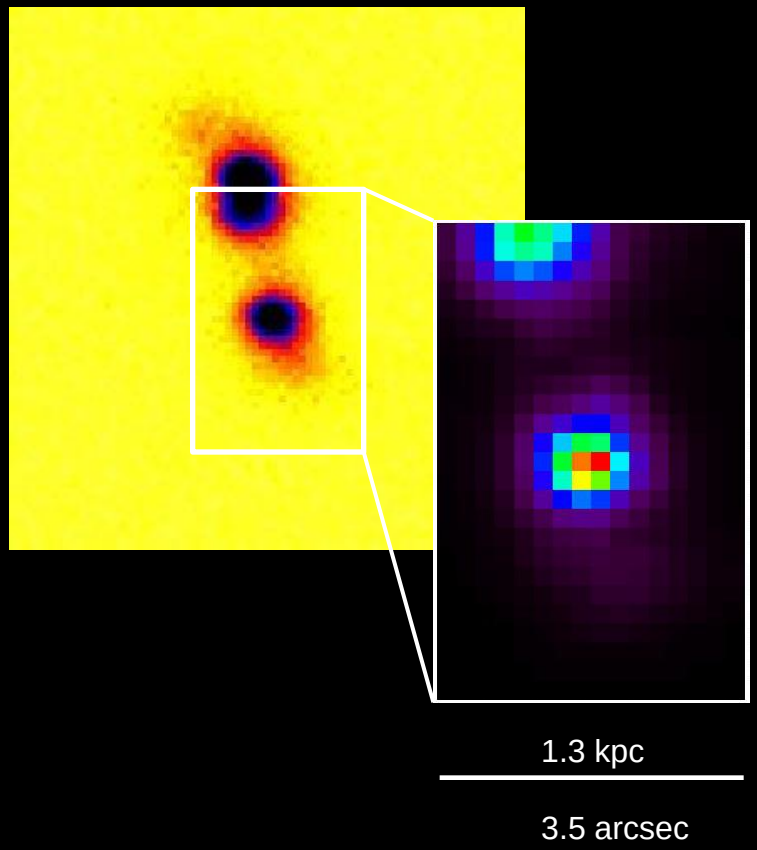
# Studying the interstellar medium of Extremely Metal poor HII/BCD Galaxies using IFU spectroscopy

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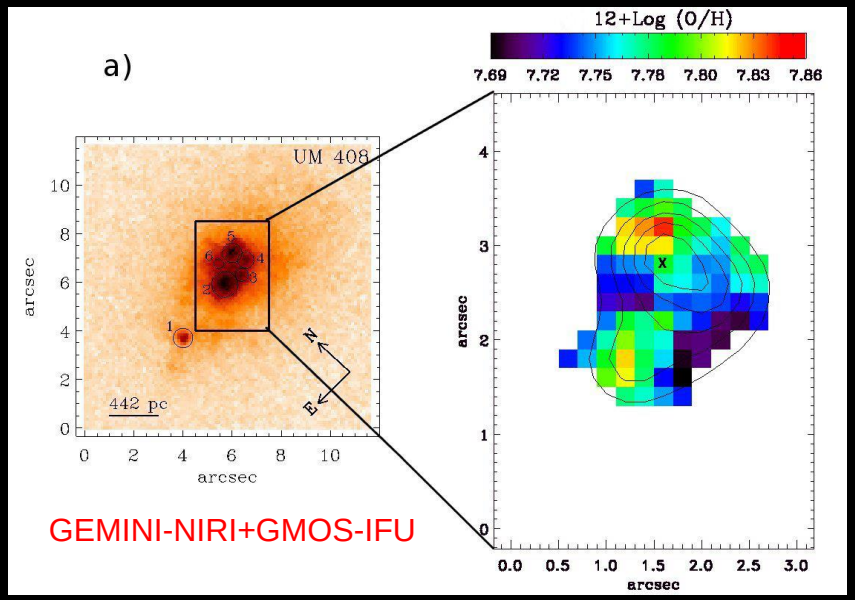
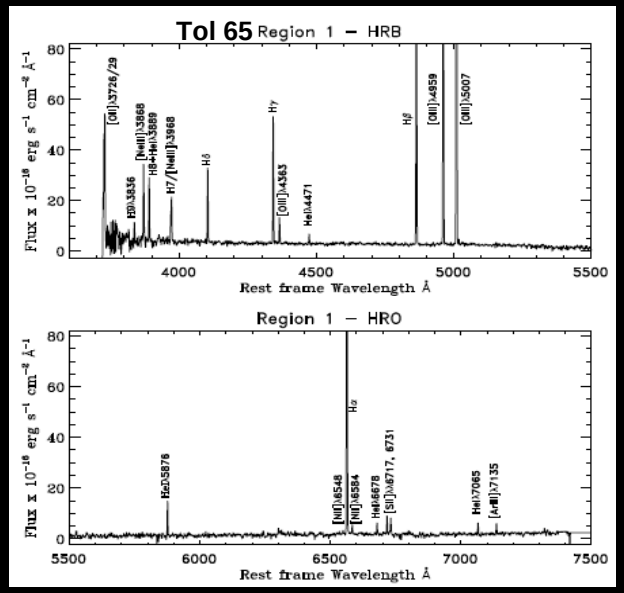
# Why study HII/BCD galaxies?

Global Properties:

- Compact ~1 kpc (dwarf galaxies)
- Emission lines – HII Like regions
(Sargent & Searle 1970)
- Metal poor galaxies ($Z_o/50$-$Z_o/3$)
- Underlying component of old stars
(e.g., Papaderos et al. 1996, Telles et al. 1997)
- Chemically homogeneous
(e.g., GMOS-IFU: Lagos et al. 2009, Lagos et al. 2012)



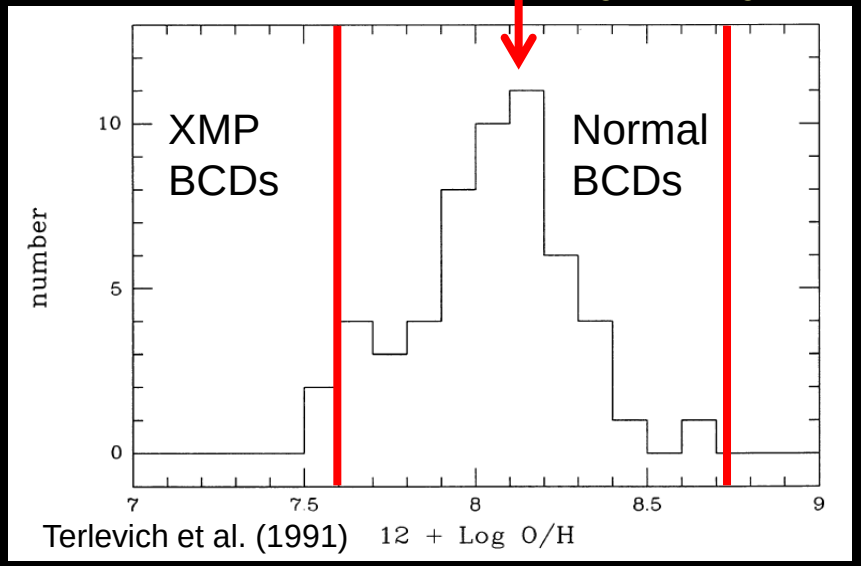

UM 408: Lagos et al. (2011); Lagos et al (2009)



# Extremely Metal-Poor BCD galaxies

## Most metal poor galaxies

12 +log(O/H) < 7.60 1/10 $Z_\odot$ $Z_\odot$

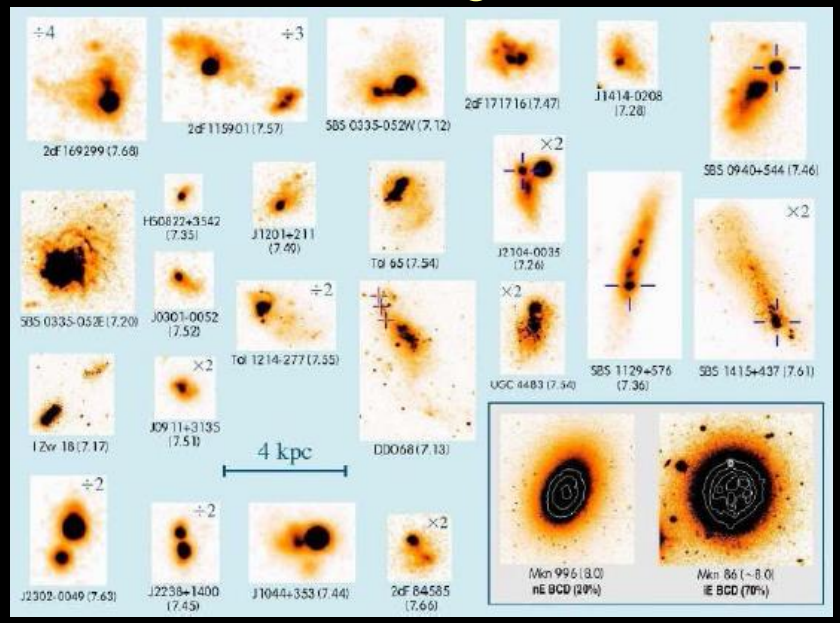



Terlevich et al. (1991)

| | | 12+log(O/H) |
|---|---|---|
| SBS 0335-052 W | ~ | 7.13 |
| DDO68 | ~ | 7.21 |
| Izw 18 | ~ | 7.17 |

## Morphology:

Cometary
GHII Regions

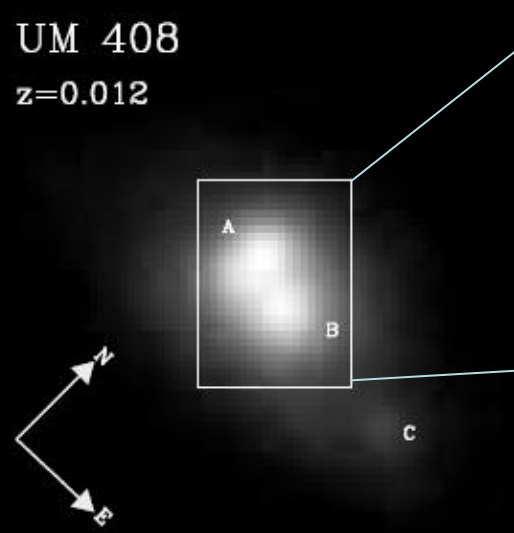



Papaderos et al. (2008)

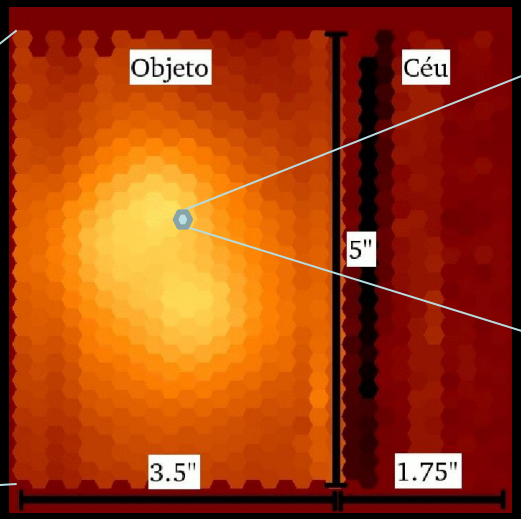
## Immediate Objectives:

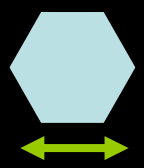
- Star formation: mechanisms and the impact in the ISM
- Stellar populations: XMP-BCDs are young galaxies?
- Chemical evolution: Spatial distribution of oxygen, nitrogen and the N/O ratio.
- Gas morphology and Kinematics.

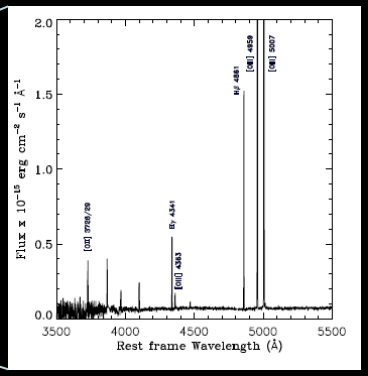
# IFU technique




Lagos et al. (2009)

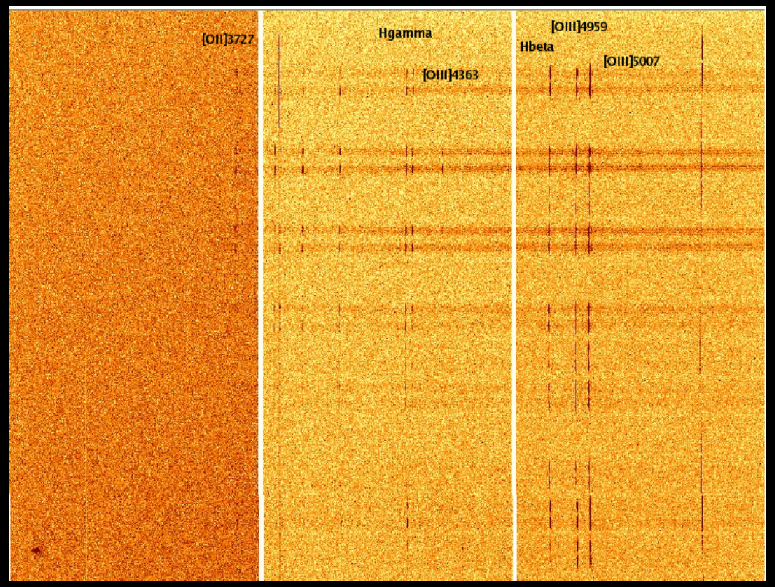


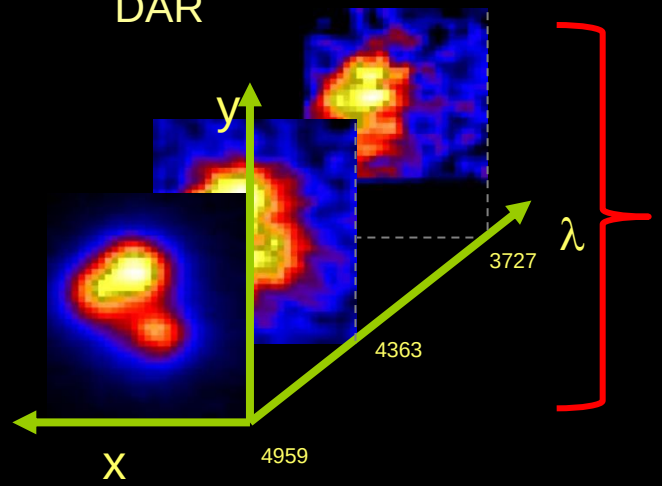




**Normal baseline calibrations:**

Flat Field
Bias
Wavelength calibration
Sky subtraction
Flux calibration
DAR



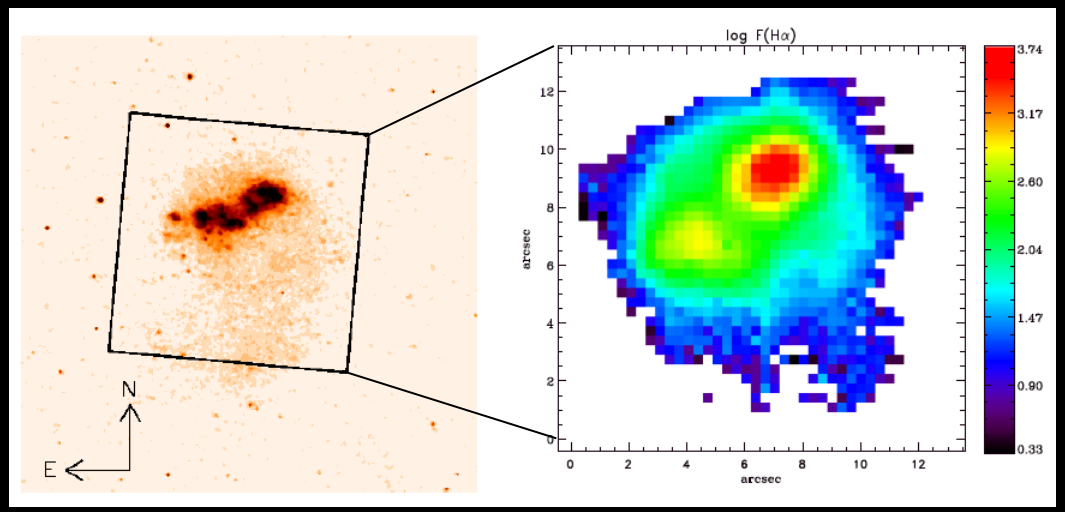

Data cube
(x,y,λ)




Maps

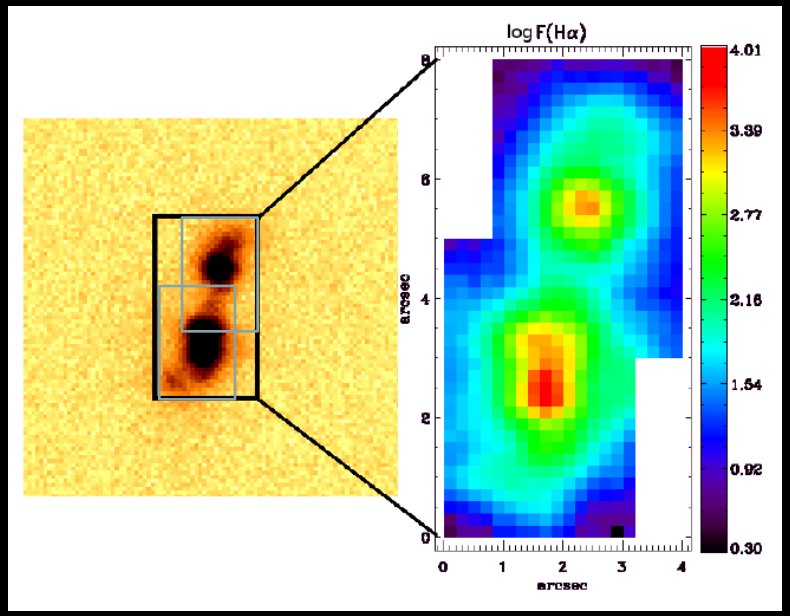
# Our Sample and observations

## Tol 65 (VIMOS-IFU)

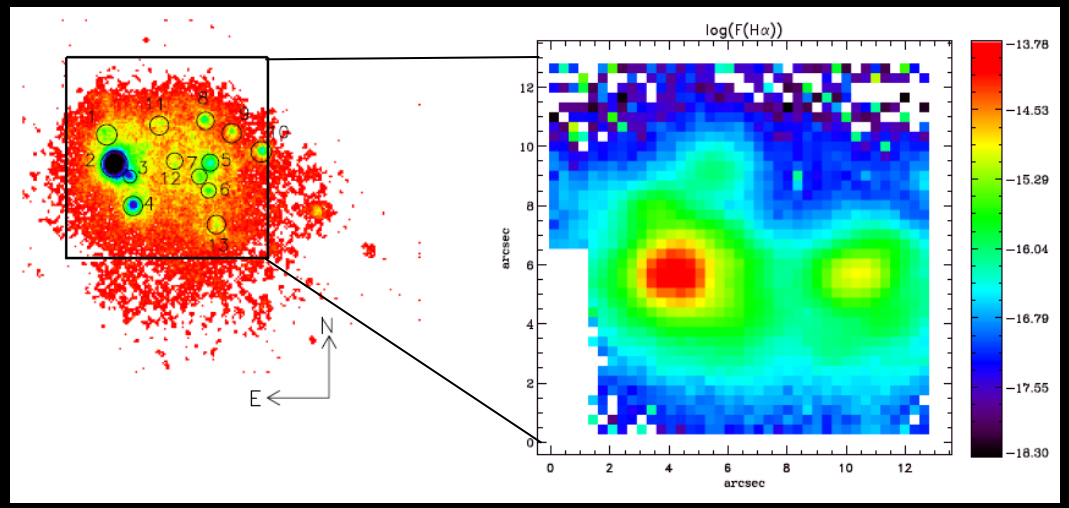



| | 12+log(O/H) | D(Mpc) |
|---|---|---|
| UM461 | 7.72 | 14.2 |
| Tol65 | 7.56 | 38.5 |
| HS2236+1344 | 7.55 | 84.4 |

## HS2236+1344 (GMOS-IFU)

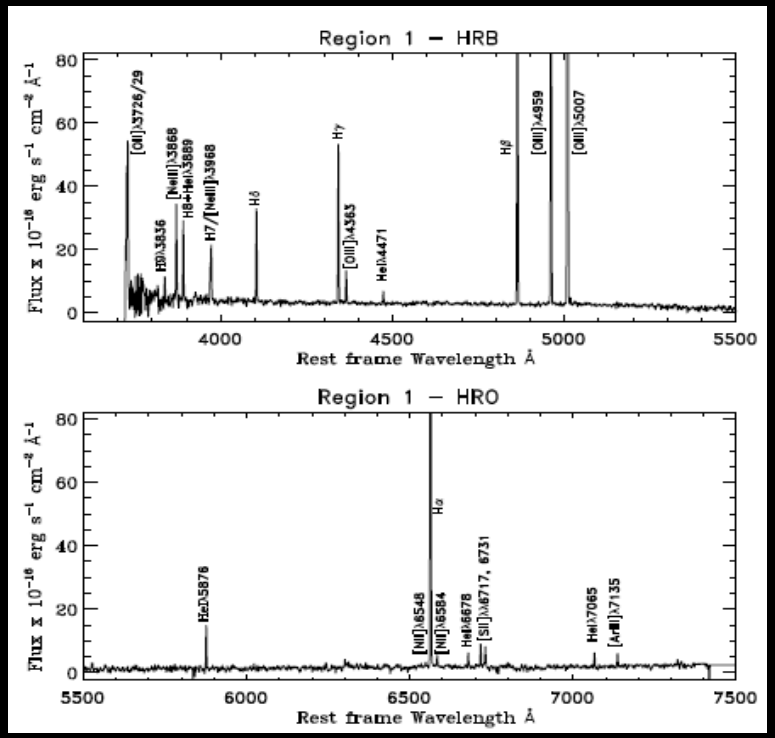



## UM 461 (VIMOS-IFU)

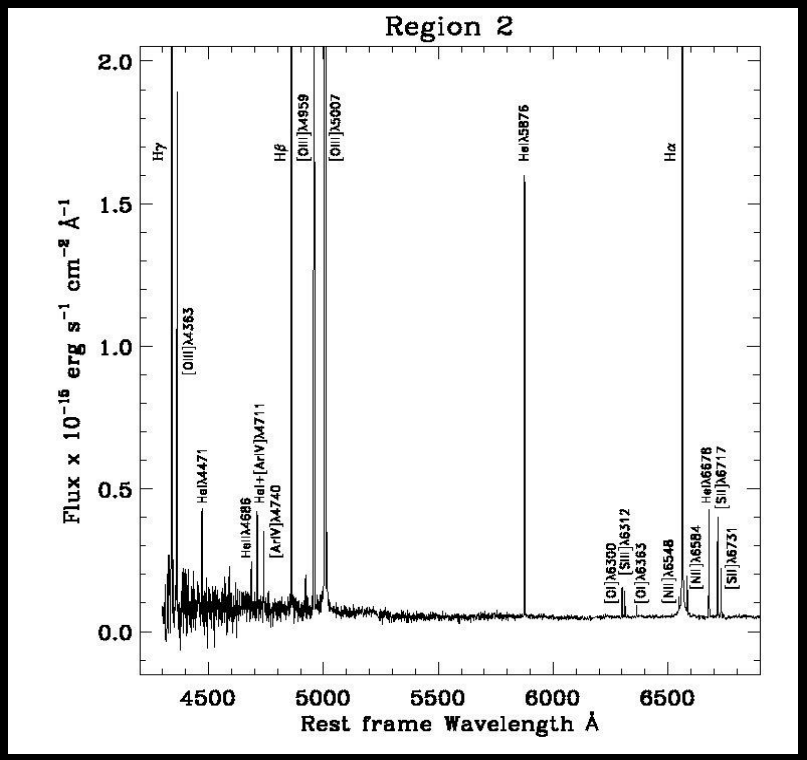


# Physical properties across the galaxies

Tol 65




HS2236+1344

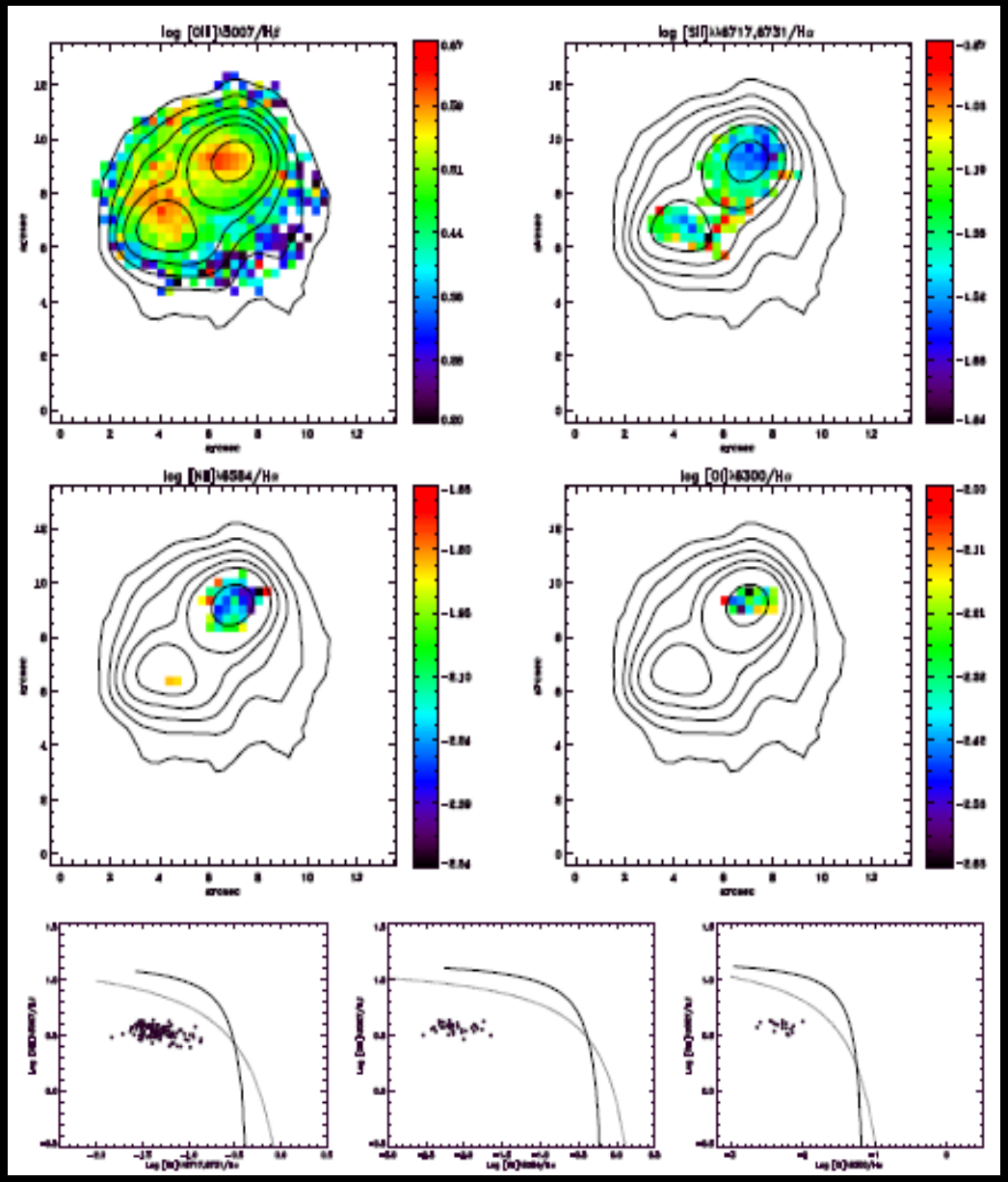



- Extinction c(Hβ): Hα/Hβ
- Emission line ratios: [OIII]/Hβ, [SII]/Hα, [NII]/Hα
- Density: [SII]λ6717/λ6731
- Temperature: [OIII]λλ5007,4959/[OIII]λ4363
- Abundances: O, N, Ne, …
- Velocity field

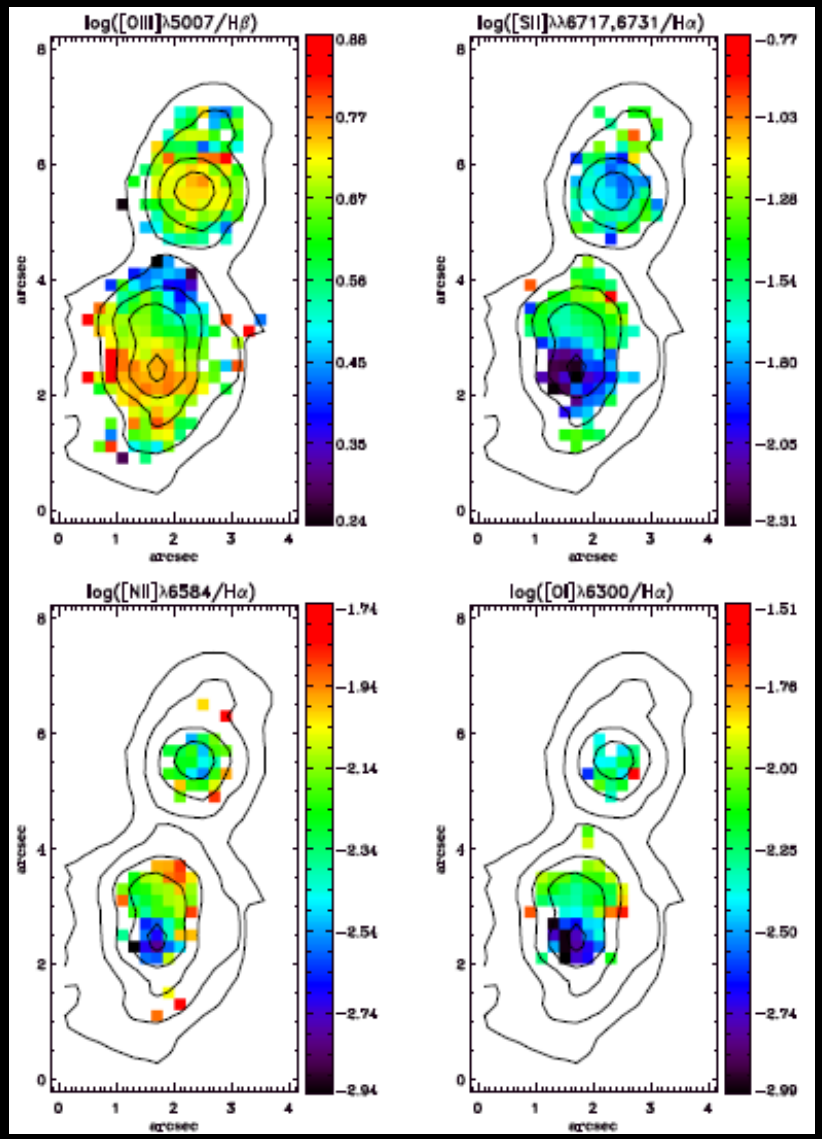
Spatial distribution

# Emission line ratios

Tol 65

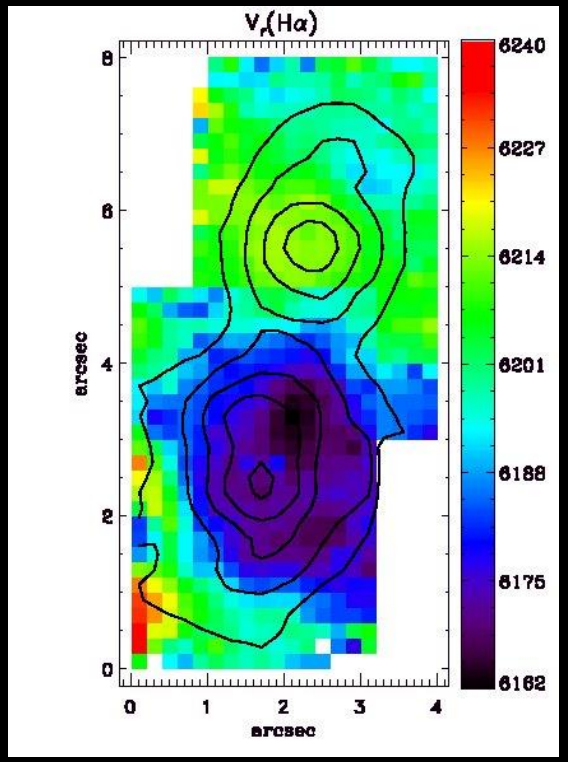



HS2236+1344



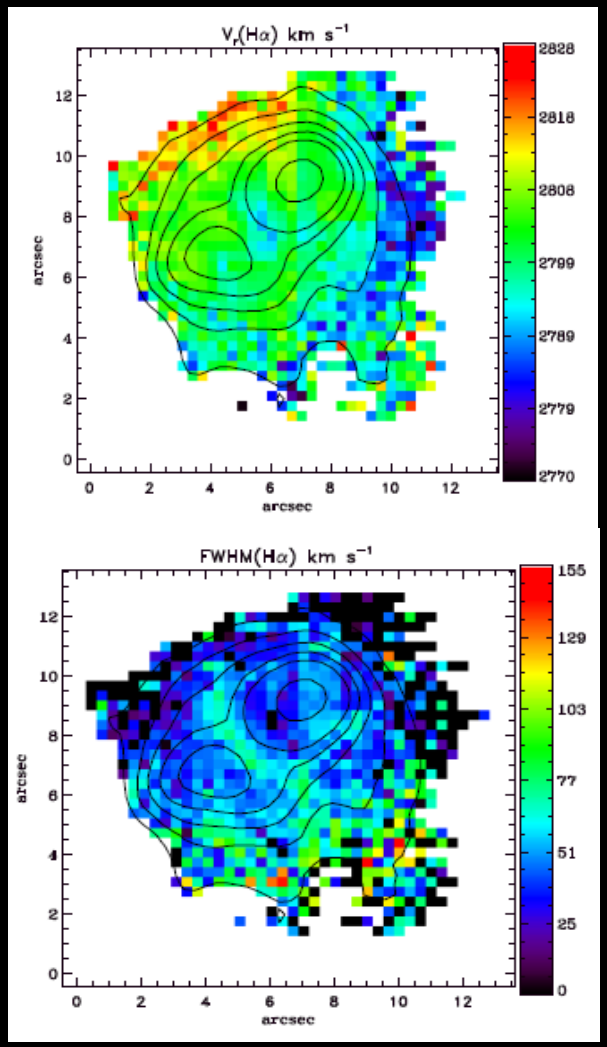
# Gas morphology and Velocity field

HS2236+1344

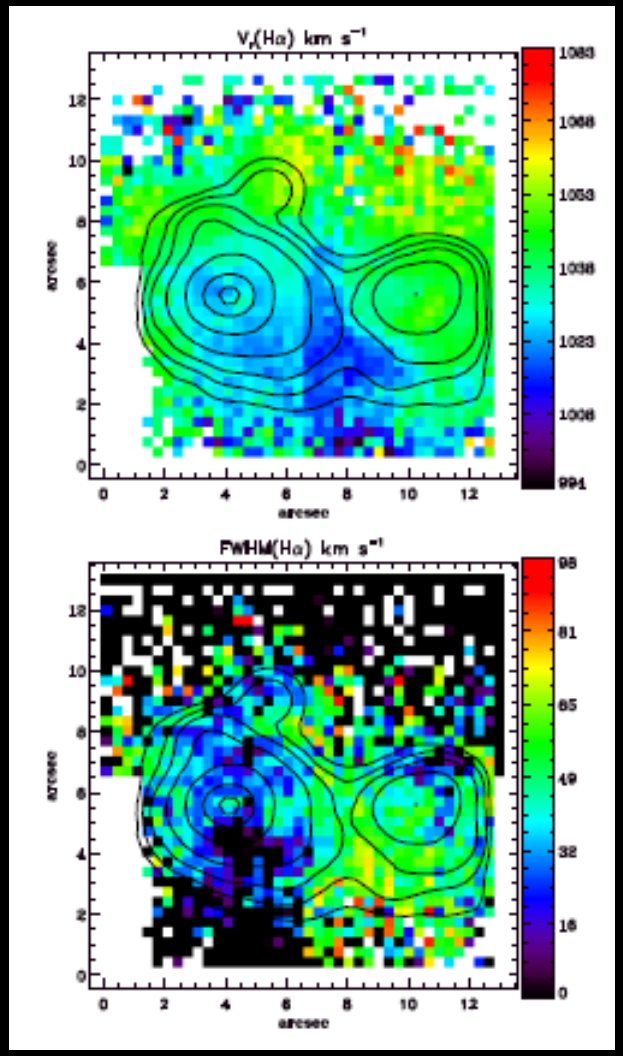



Disturbed ISM

Tol 65

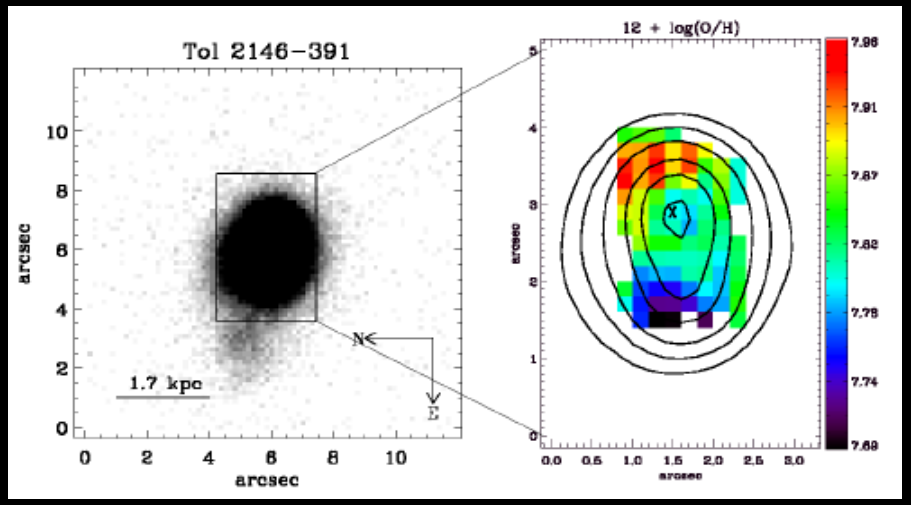



UM 461



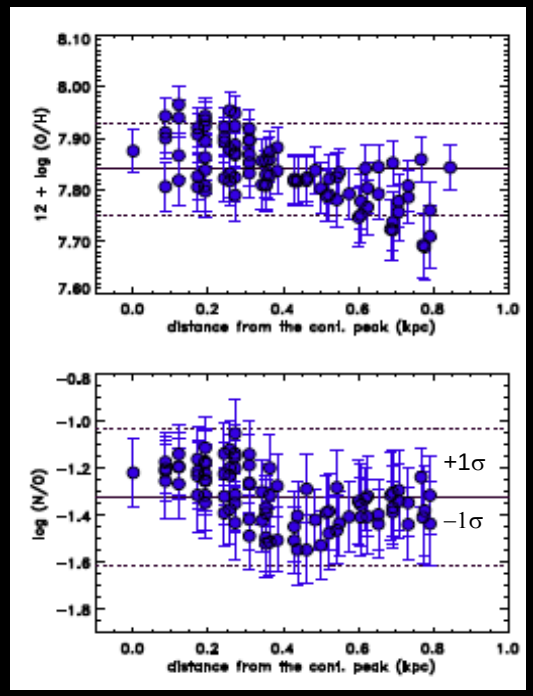
# Abundance patterns

$T_e$(OIII)
[OIII]λ4363 (S/N)> 3

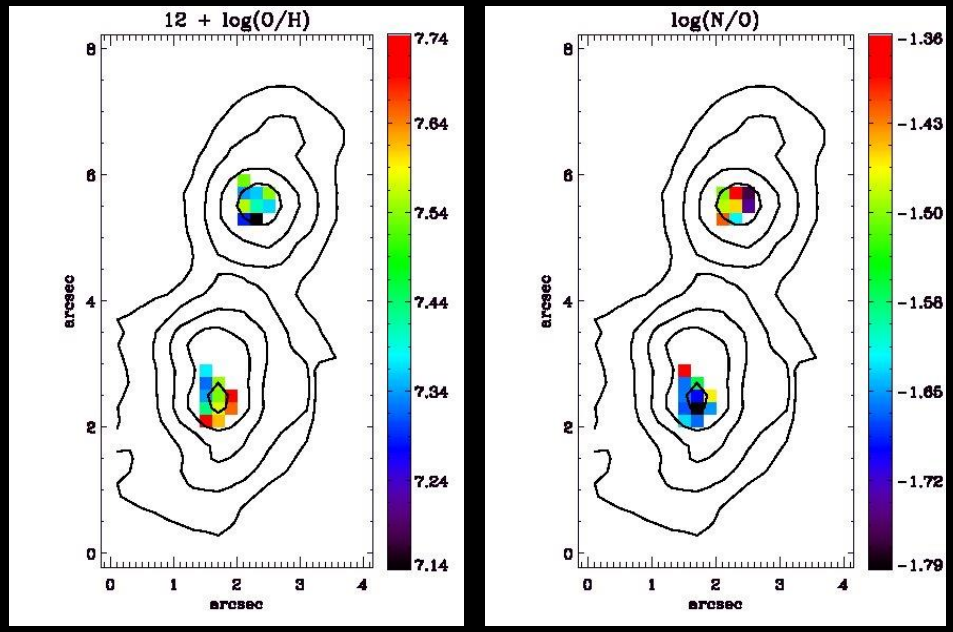


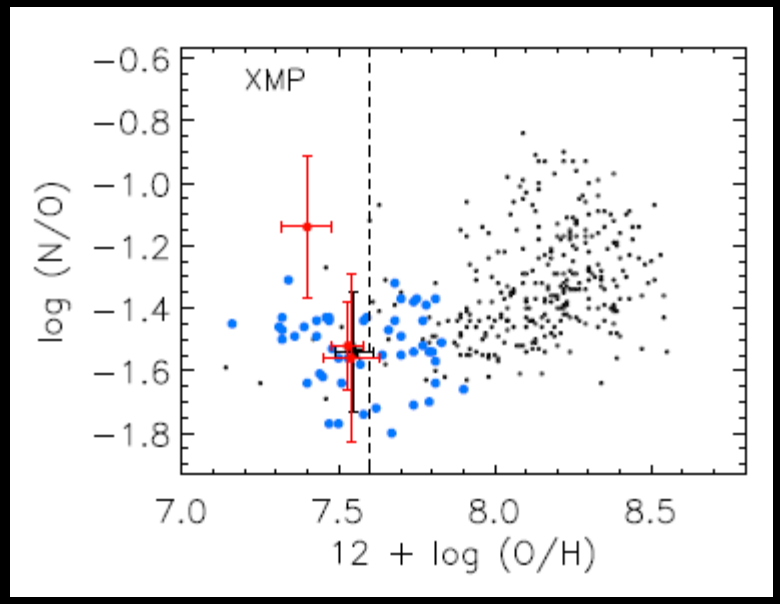

Tol 2146-391
(Normal BCD)

Lagos et al. (2012)




HS2236+1344 (XMP BCD)



# Summary:

We confirm that, within observational uncertainties, our sample galaxies of XMP HII/BCD galaxies show spatially constant chemical abundances, similar to other low-mass starburst galaxies. A high N/O value is observed in one region of HS2236+1344 galaxy.

We suggest that global hydro-dynamical processes, such as starburst-driven super-shells or/and inflow of gas might be governing the transport and mixing of metals across these galaxies, keeping the N/O ratio constant through the ISM at large scales.