



The GASP survey

GA**s** Stripping P**h**enomena in galaxies with MUSE



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European Research Council
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The team

→ Local staff



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→ The students

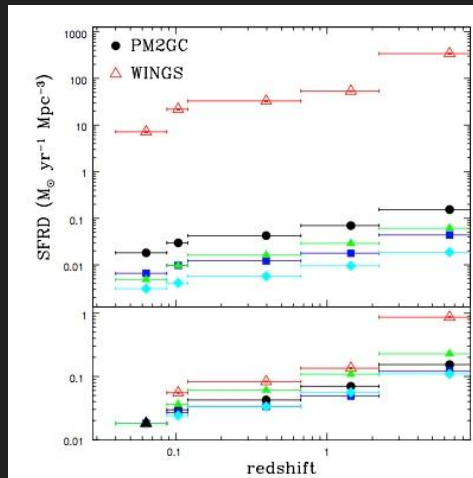
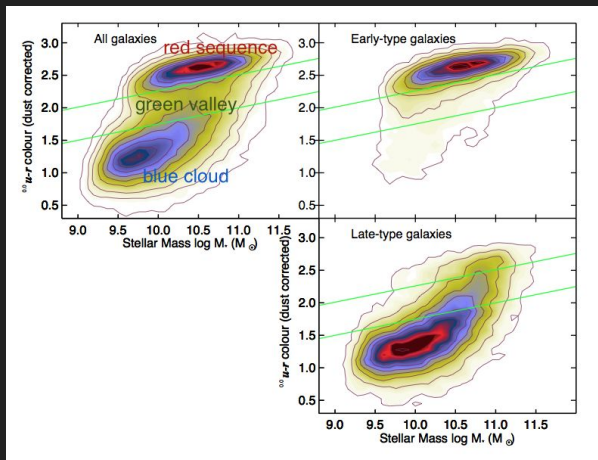
Andrea Franchetto (PhD)

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(Master, w. G. Rodighiero)

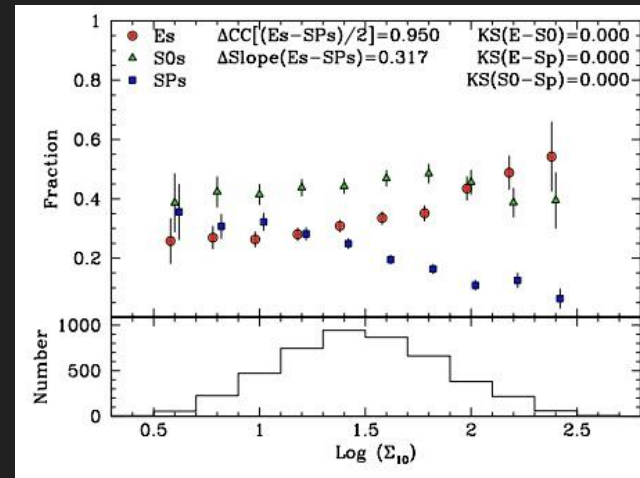


What do we do: galaxy evolution in different environments

Galaxy morphology/color/SF linked to Mass and Environment: how?



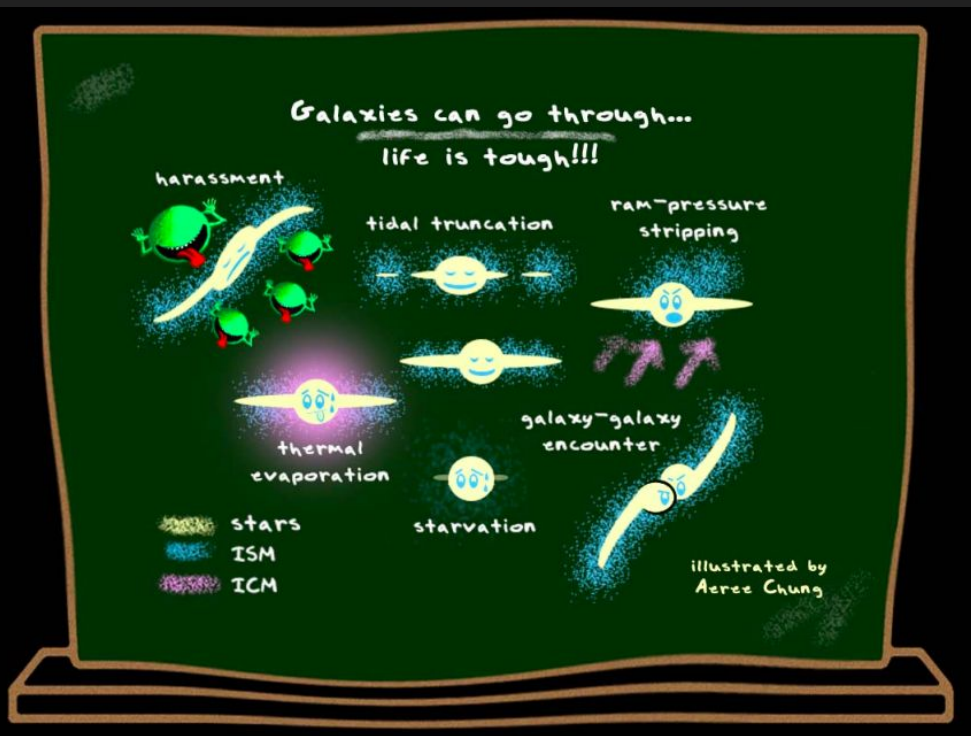
Guglielmo+2015, WINGS



Fasano+2015, WINGS

SF is efficiently suppressed in galaxy clusters and ET galaxies are dominant in the densest (central?) regions

The complicated life of a galaxy



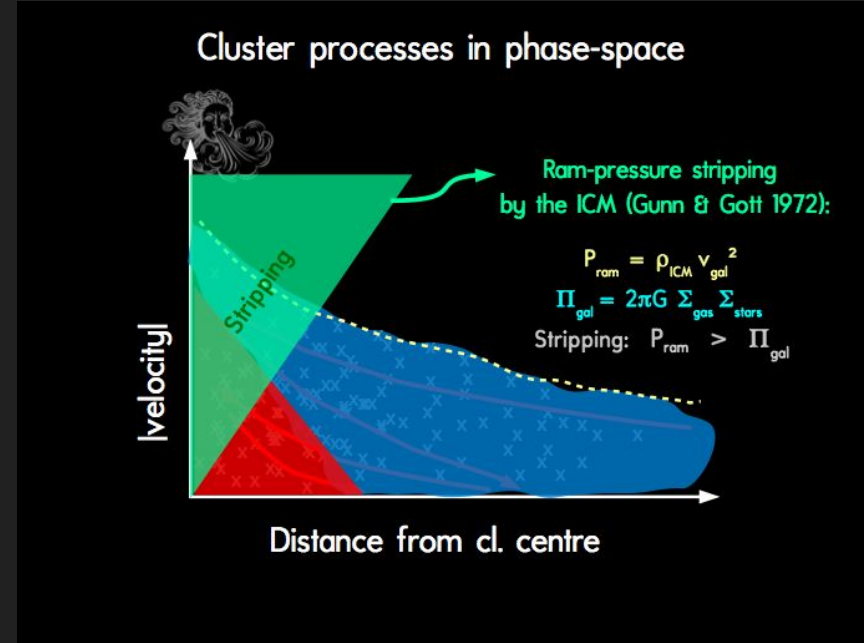
→ RPS, strangulation (fast and slow gas-only removal)

→ mergers, tidal interaction (gas and stars)

→ internal mechanisms (AGN, stellar winds)

All these mechanisms lead to a change (more often suppression or quenching) of the galaxy Star Formation by altering the gas content

The ram pressure stripping



The jellyfish galaxies

“Galaxies with clearly distorted images, with optical data resolving multiple filaments offset asymmetrically from the galaxy” [Smith et al., 2010, UV asymmetry]

Owen et al., 2006; Cortese et al., 2007; Owers et al., 2012 - ACS data $z > 0.2$



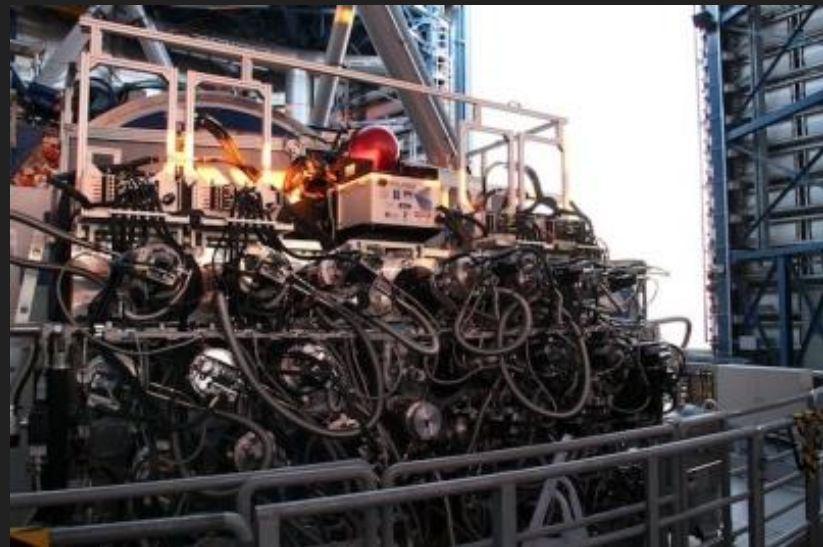
IC 3418 in Virgo
Hester+2010,
Fumagalli+2011,
Kenney+2014

The GASP survey

GAs Stripping Phenomena in galaxies with MUSE

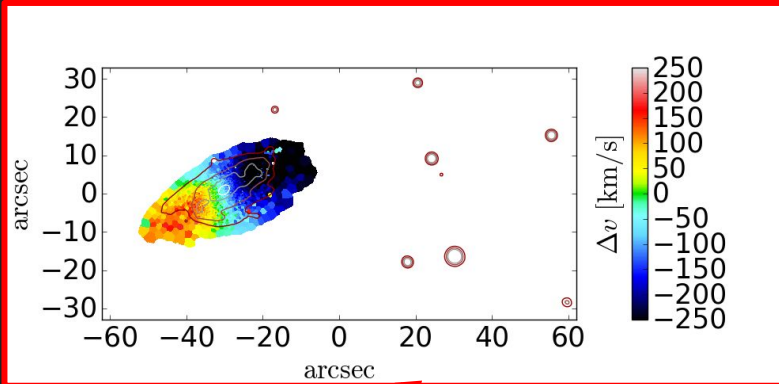
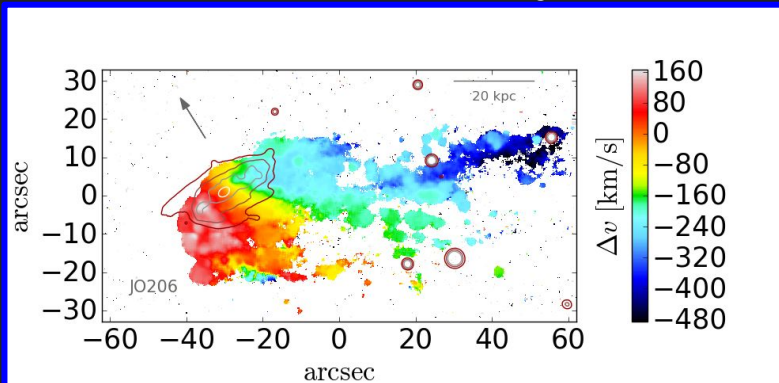
- 114 [94+20] gx, 120 hrs, 2700s/pointing, $1e5$ spectra/pointing
- $0.2''/\text{px}$, 2.5 Å FWHM, 4700-9300
- **Fov ($1' \times 1'$) $\sim 60 \times 60 \text{ kpc}^2$ (4-10 Re)**
- Completed in 2018 (already ESO Phase 3)

- Galaxies in different environments (clusters, groups, field+control sample)
- Galaxies with different masses (from 10^9 to $10^{11.5} M_{\odot}$)
- Galaxies with different stripping signatures (Jclass 1-5, taken from Poggianti et al., 2016)





The GASP survey results: **YES RPS is at work**

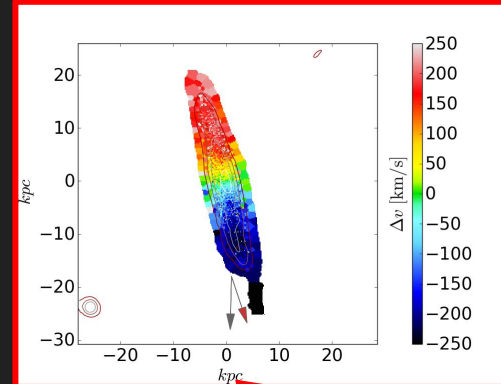
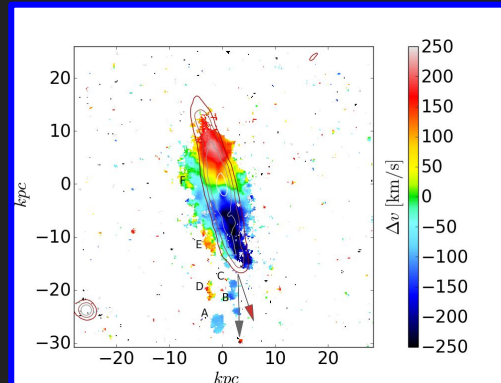


Poggianti+2017a (GASP I)

Gas vs **stellar**
kinematics to infer
ram pressure
stripping

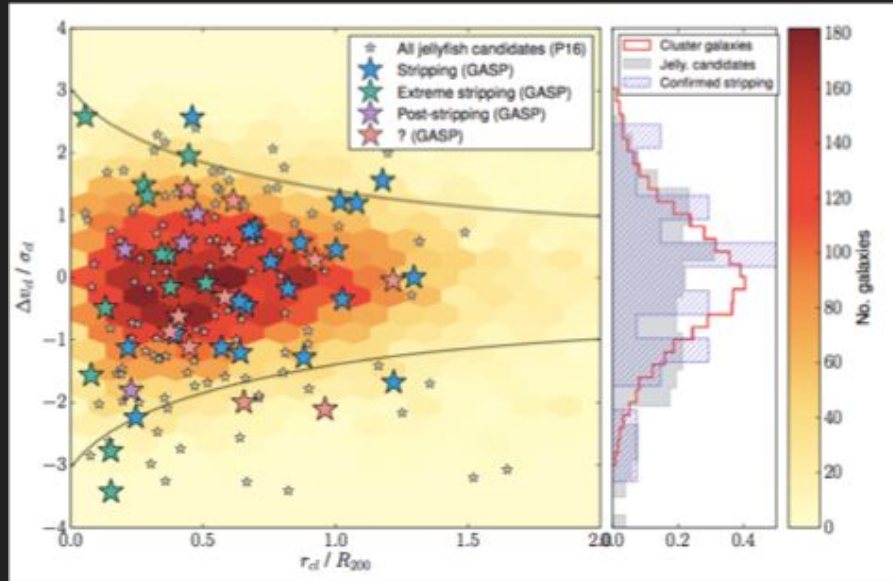
→ RPS effective in
low and high mass
clusters

Different stripping stages!



Fritz+2017 (GASP III)

The GASP survey results: and we understand which galaxies it affects. In particular, jellyfish galaxies are at peak stripping



Jellyfish galaxies are those undergoing the strongest ram pressure (peak stripping)

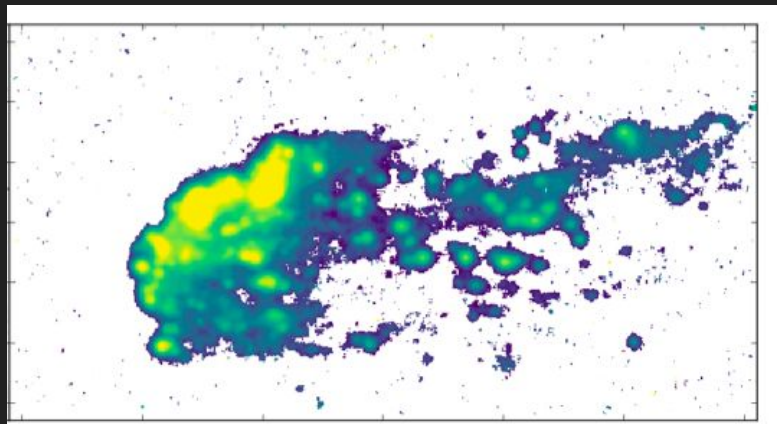
→ Inside R200 JF avoid the virialized part of the clusters (confirmed by 2d KS test)

→ Extreme JF all within $0.5 \times R_{200}$, and most have $|\Delta v|/\sigma > 1$ i.e. where RPS is expected to be more efficient

→ Both extreme and mild stripping galaxies are recent infallers (but with different distributions)

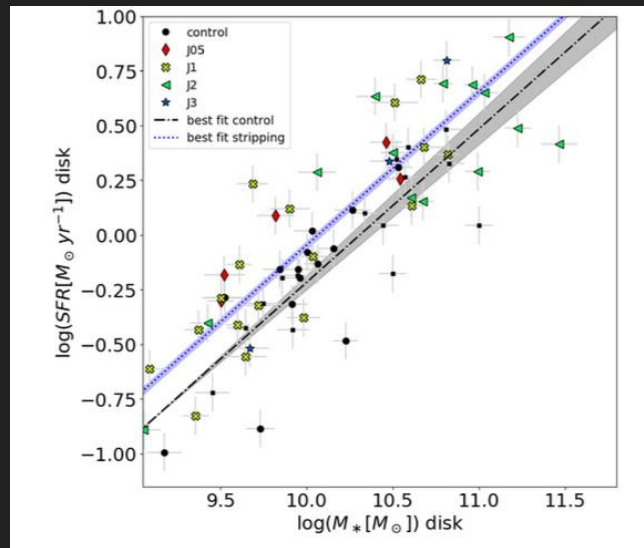
→ Post-stripping galaxies closer to the center (deceleration post pericentric passage?)

The GASP survey results: while quenching the overall SF RPS (initially) enhances the SF in the disk and in the tails



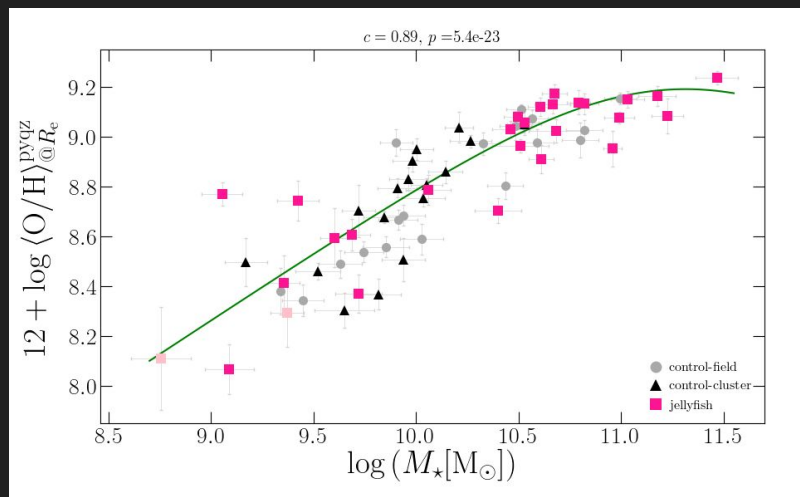
SFR in the tails is typically 2-5% (up to 20%) of the total SFR, within giant (Carina Nebula) and SuperGiant (30Dor) HII regions

Poggianti+2019 (GASP XIII)



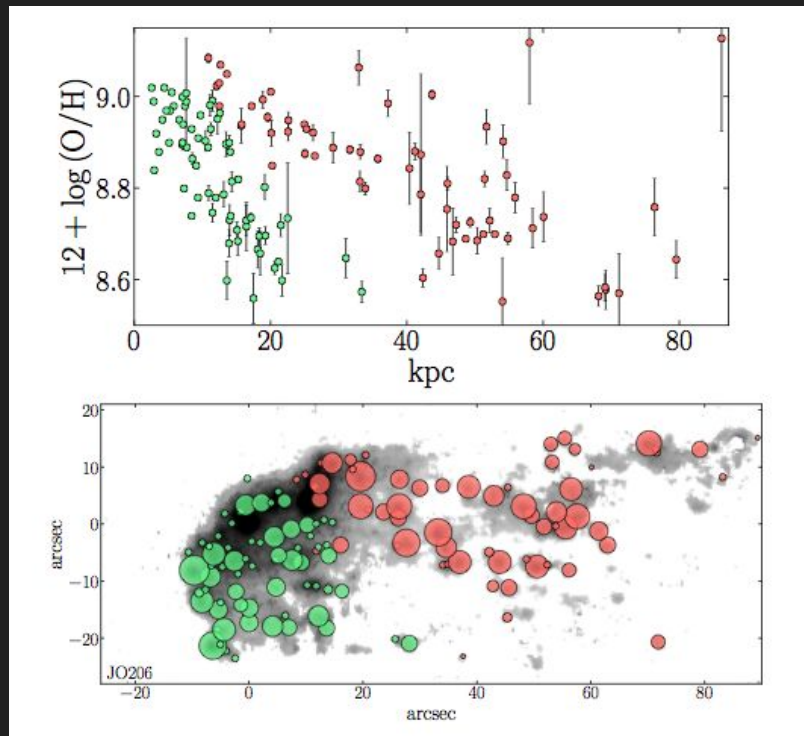
Vulcani+2018c (GASP XIV)

The GASP survey results: leaving unaltered the metallicity within R_e and producing different gradients in the tails (TBC)

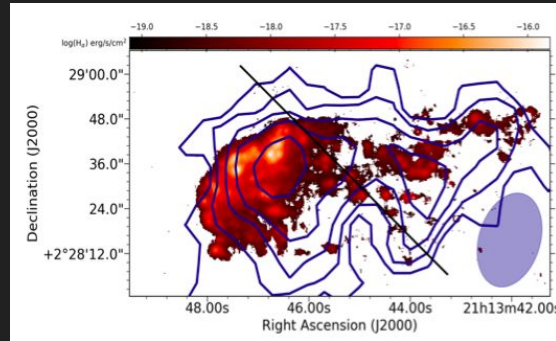
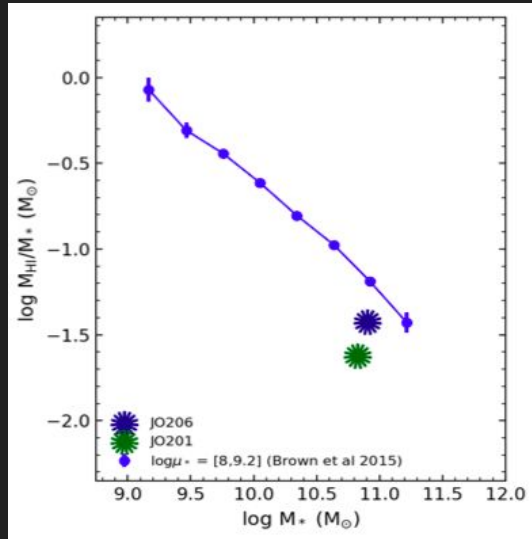


Mass-metallicity relation at R_e from IFU spectroscopy for different samples of galaxies / Metallicity gradients in JF galaxies

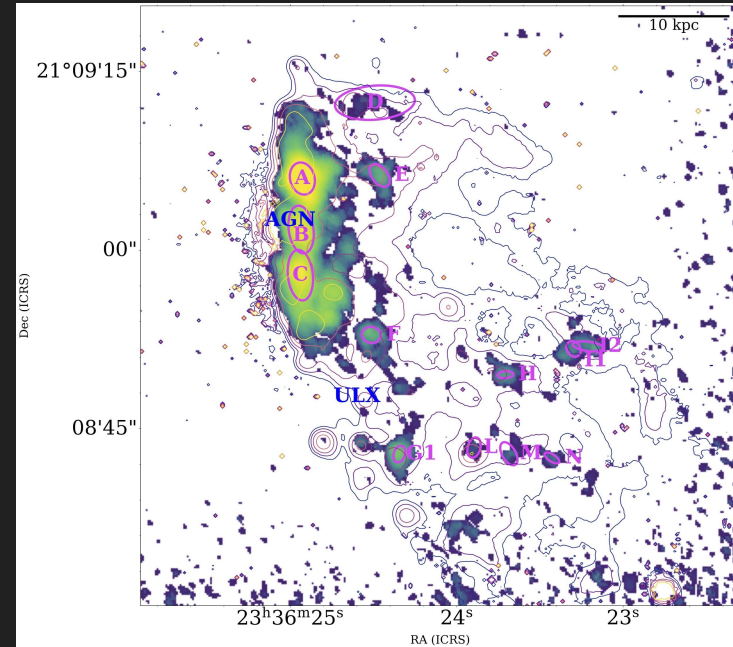
Franchetto+, in prep



The GASP survey results: the picture starts to be confirmed by the study of the other gas phases



HI and H2 (from APEX and ALMA) follows H+ probing SF in situ within the stripped tails



Ramatsoku+2019 (GASP XVII)

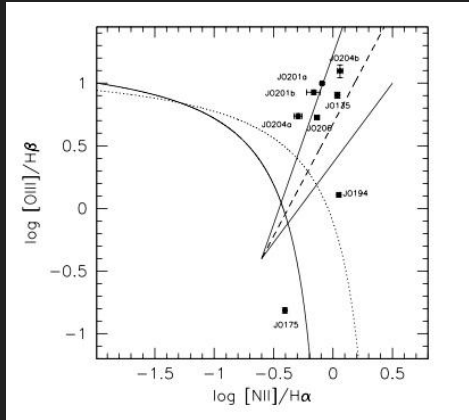
HI gas (from JVLA) depleted

Moretti+, in prep.

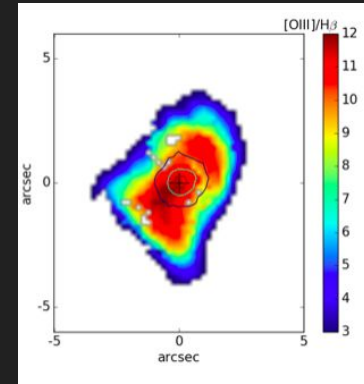
The GASP survey results: and our JF host AGNs (SURPRISE!) → AGN and RPS are connected

Poggianti+2017b (GASP VI)

JFs in the BPT diagram: 5 Sy2, 1 Li



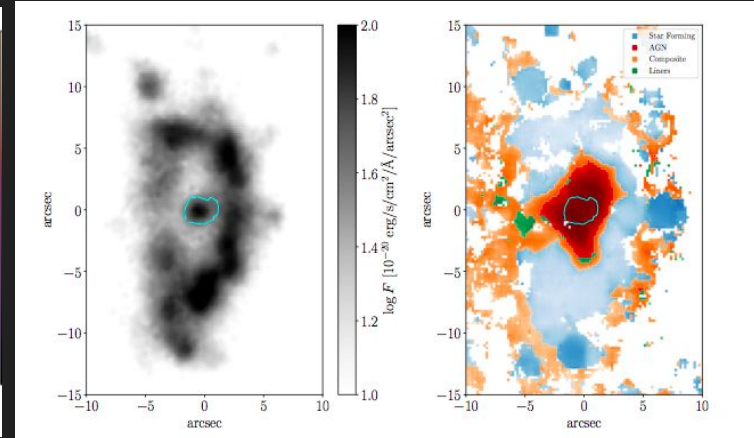
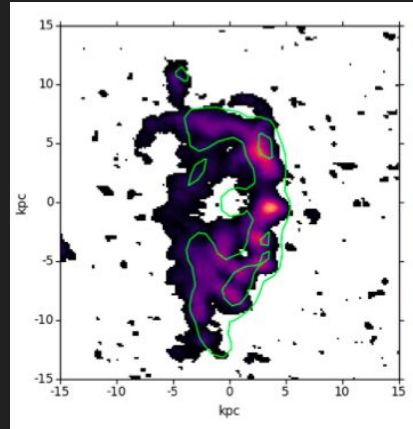
Resolved line ratios confirming AGN origin



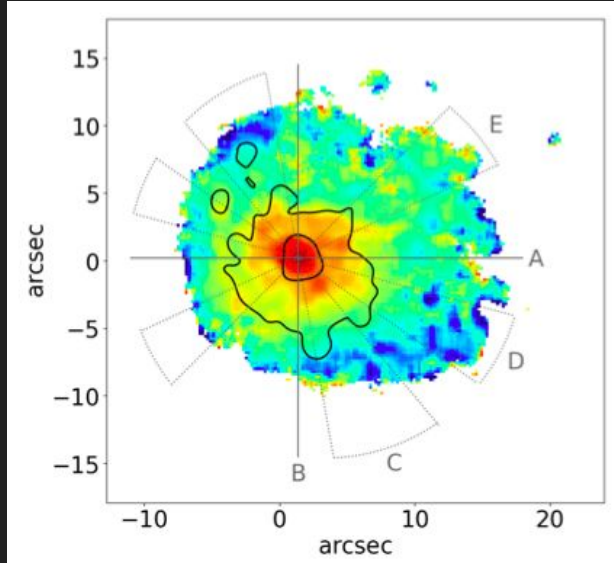
Radovich+2019 (GASP XIX)

Multiphase view of JO201 with CO hole, UV cavity, AGN central dominated region (8 kpc)

George+2019 (GASP XVIII)

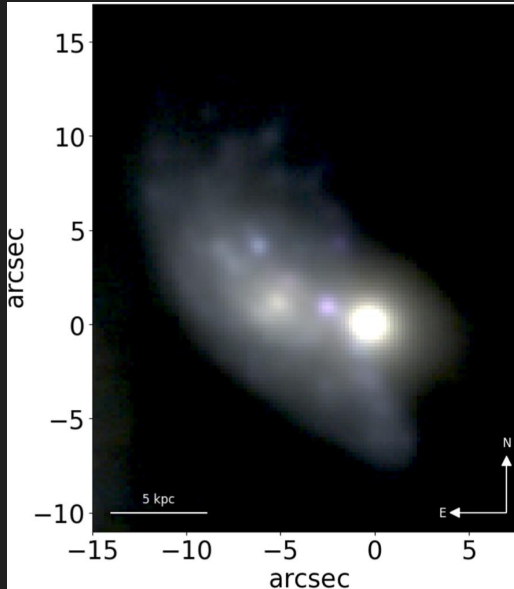


The GASP survey results: other processes at work in different environments (+RPS?)



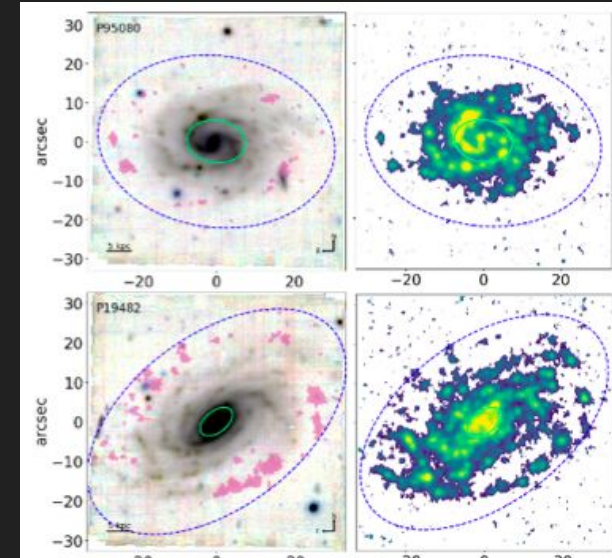
Evidence of **gas accretion** (mainly through metallicity gradients)

Vulcani+2018a (GASP VII)



Evidence of **merging** between ET and LT galaxies (+Tidal dwarf)

Vulcani+2017 (GASP VIII)



Peculiar H α distribution in galaxies along filaments possibly due to **cosmic web enhancement**

Vulcani+2019a (GASP XVI)

Thanks!

