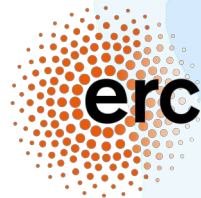
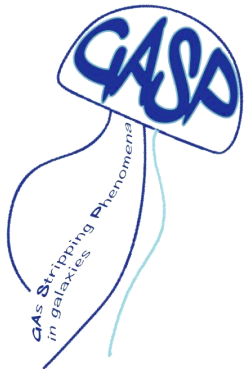


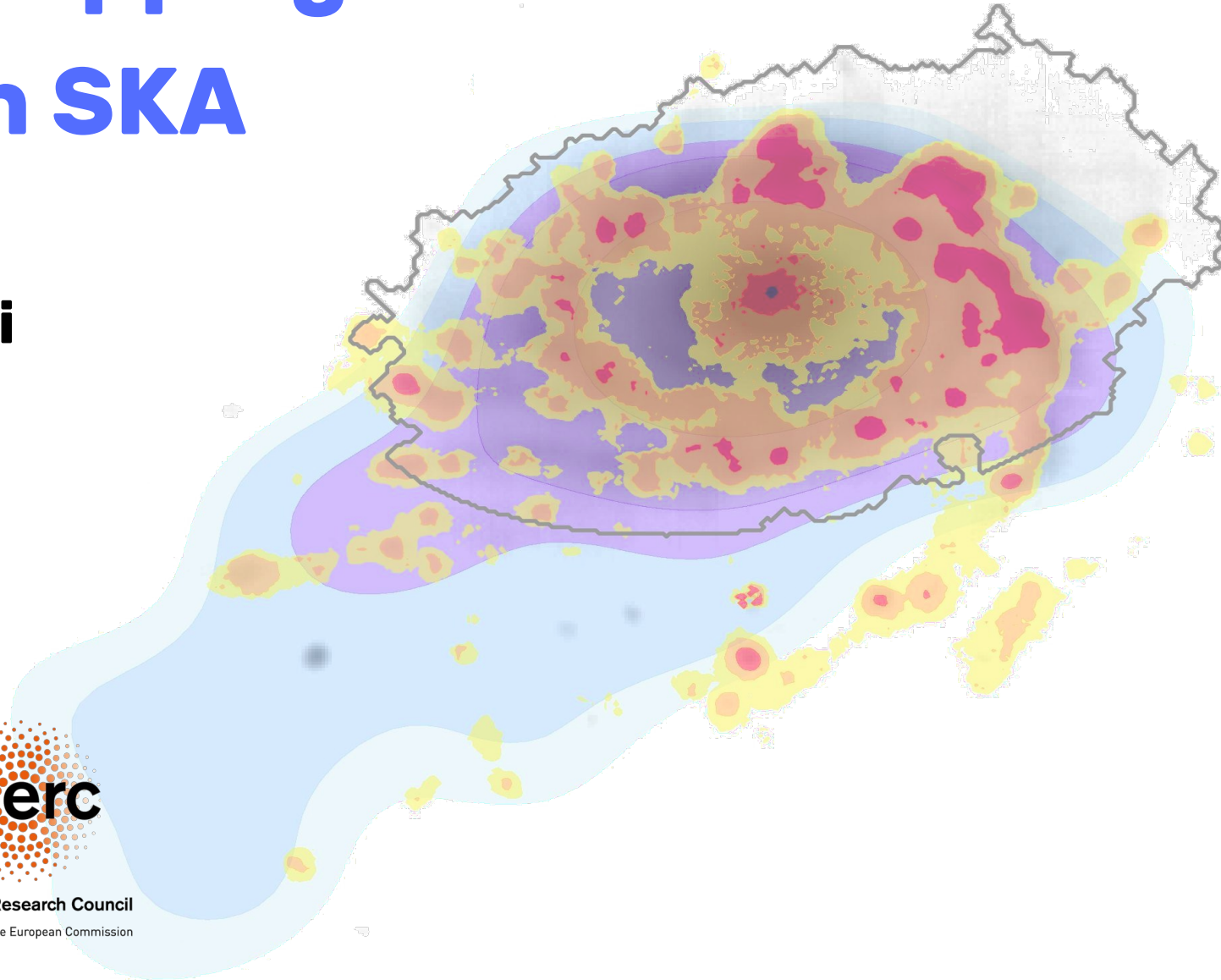
# Exploring the physics of ram pressure stripping in clusters and groups with SKA

**Alessandro Ignesti**

[INAF-Padova]  
& the **GASP** team

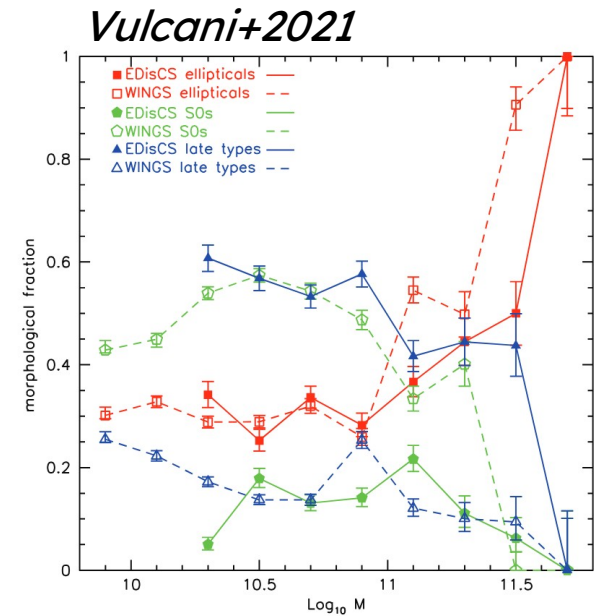
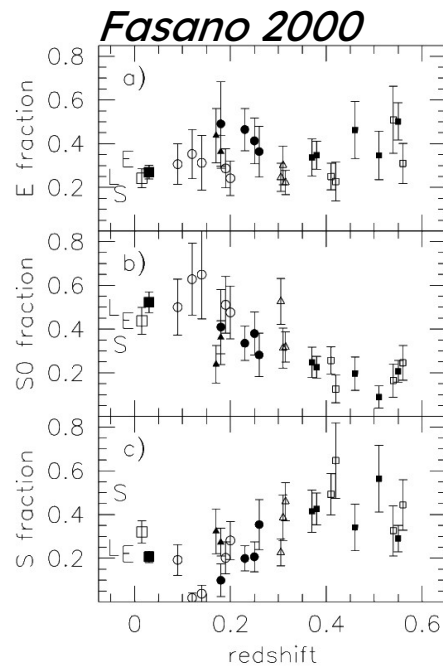
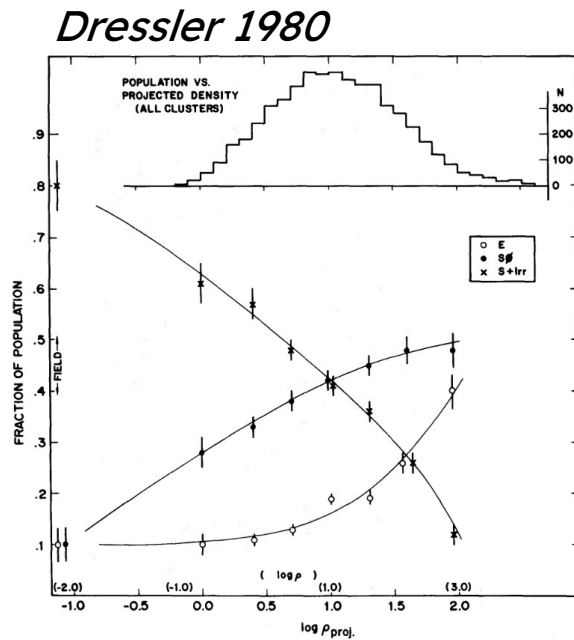


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# Introduction:

## Ram pressure stripping

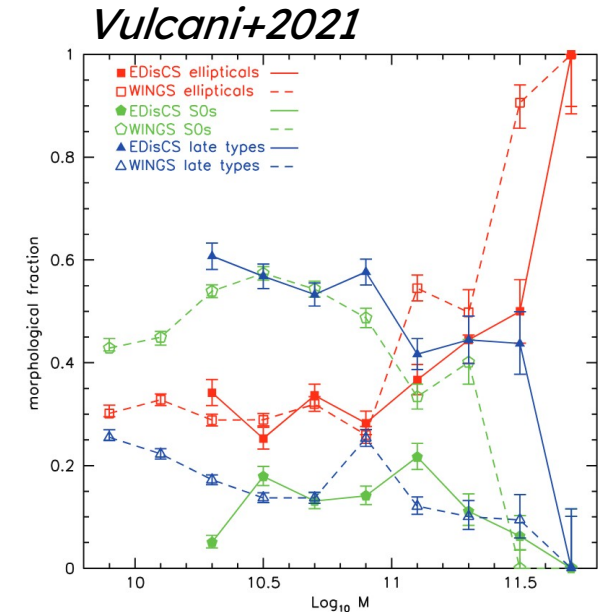
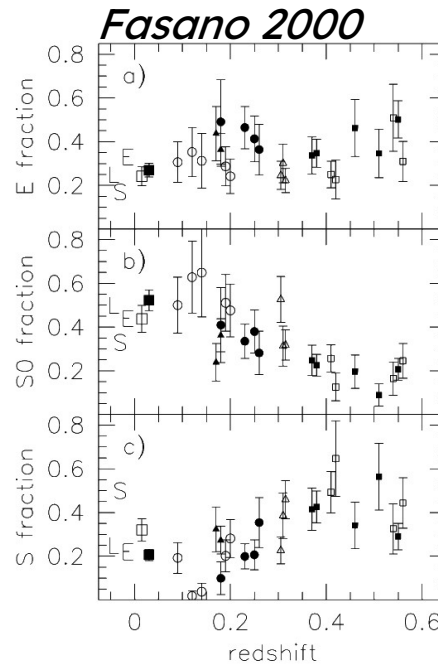
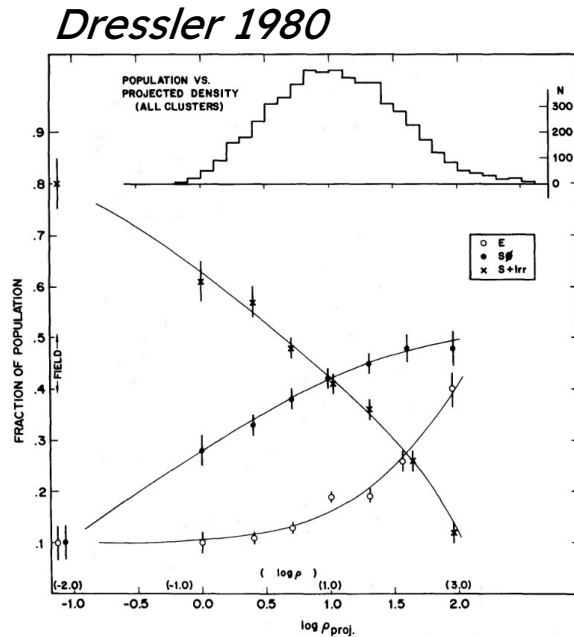


**Galaxy clusters are accelerator of galaxy evolution**

....but how?

# Introduction:

## Ram pressure stripping

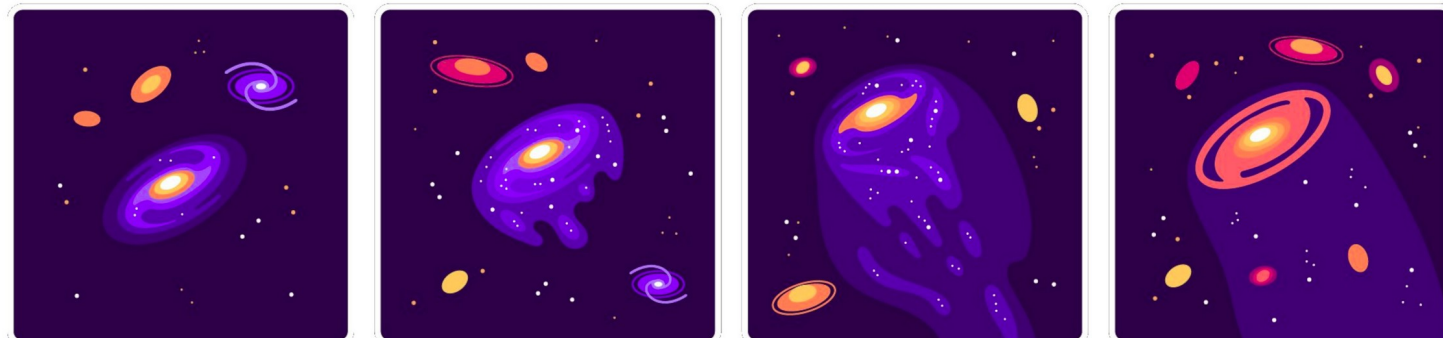


**Galaxy clusters are accelerator of galaxy evolution**

....but how?

**Ram pressure:** *pressure exerted on a body moving through a fluid medium*

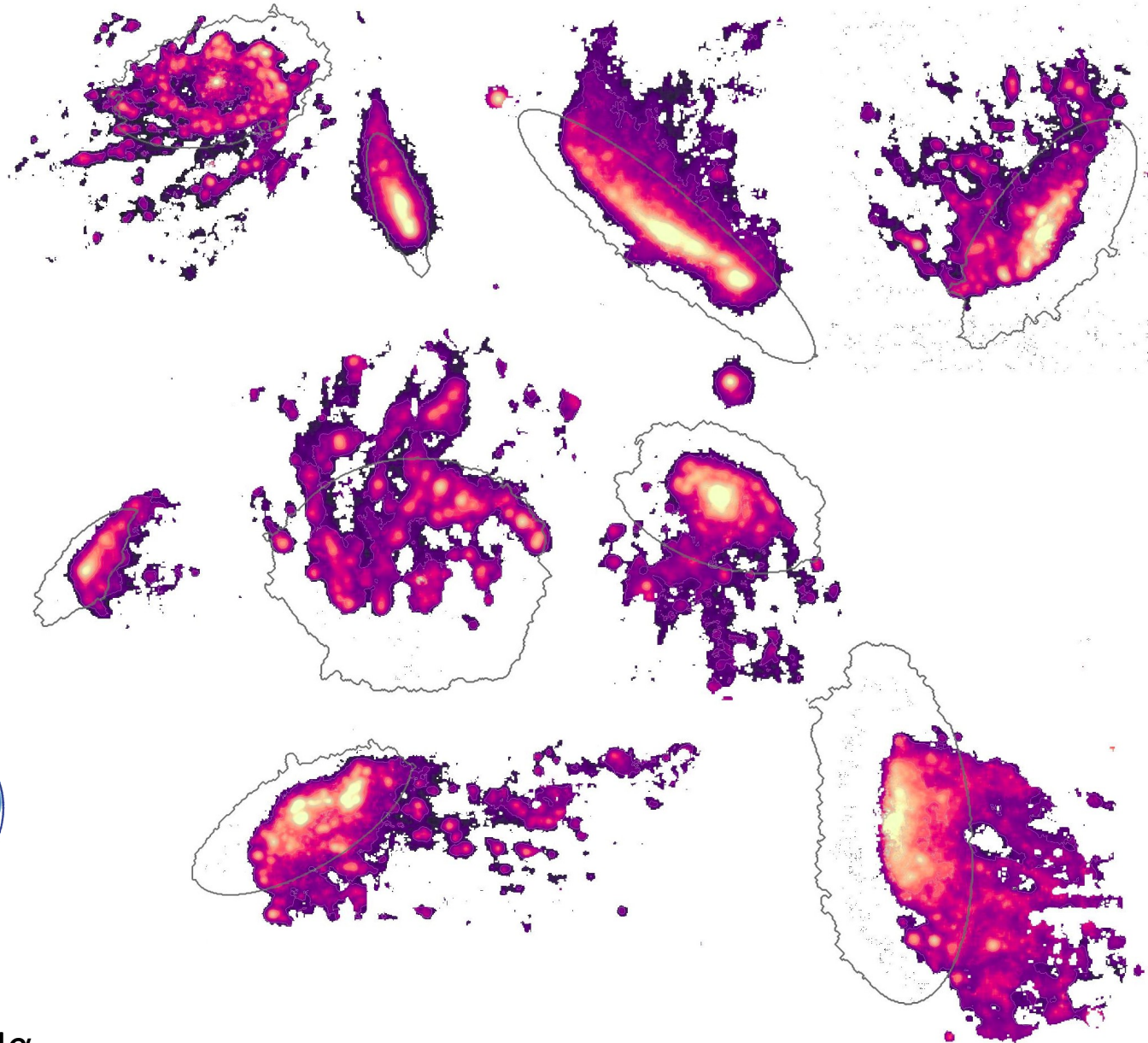
ICM Ram pressure = (ICM density)  $\times$  (Galaxy velocity)<sup>2</sup> [Gunn&Gott 1972]



*For reference: van Gorkom 2003, Boselli & Gavazzi 2006, Poggianti+2016, Boselli+2021*

# Introduction:

## Jellyfish galaxies



Two reasons to study JF galaxies:

- **Missing link in galaxy evolution**
- **Galaxy astrophysics under extreme conditions**



MUSE H $\alpha$

**GASP:** 114 galaxies at  $0.04 < z < 0.07$

**Study the processes regulating gas removal in galaxies**

More GASP at:

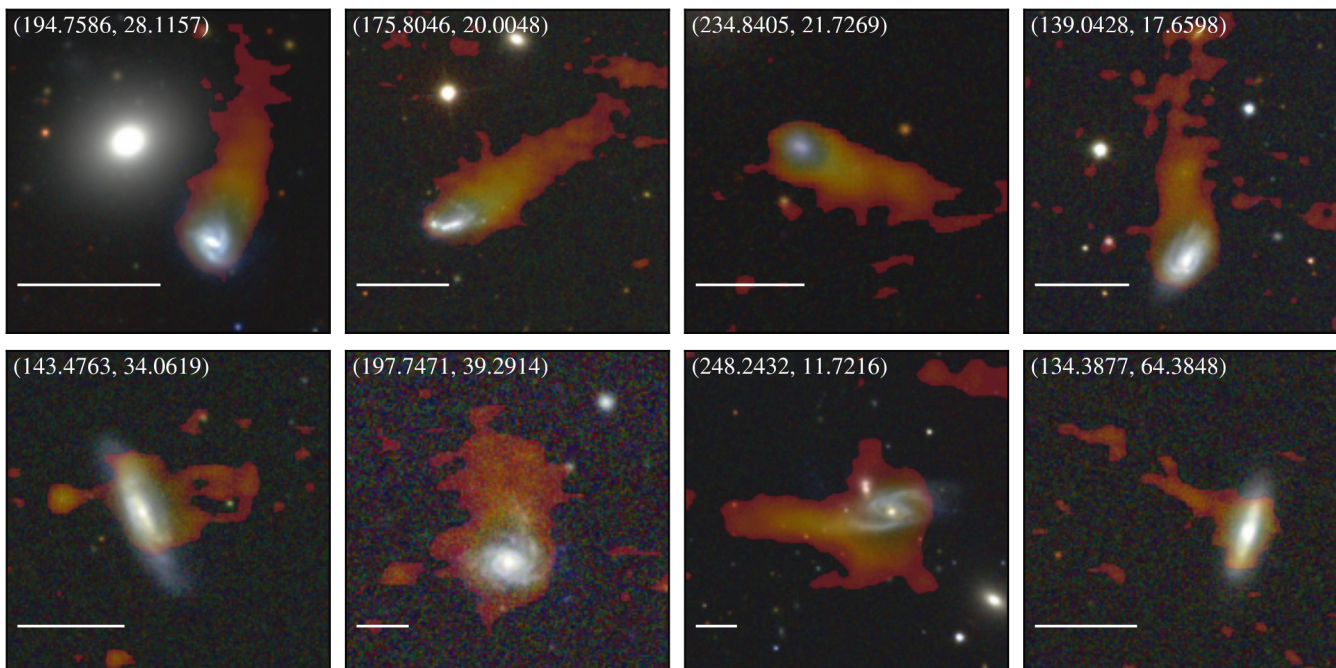
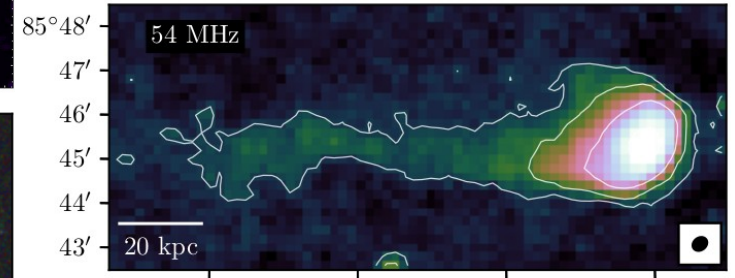
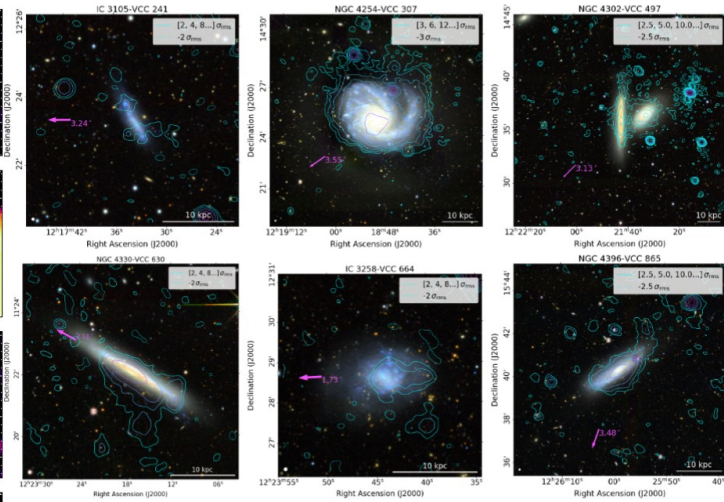
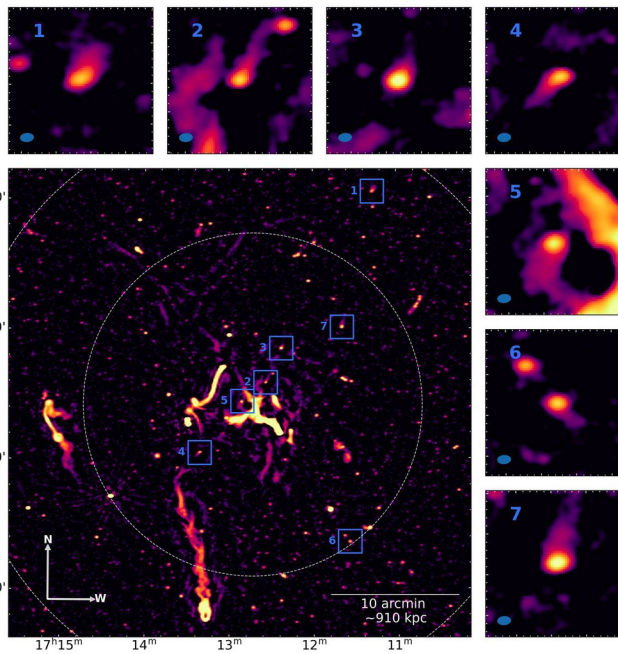
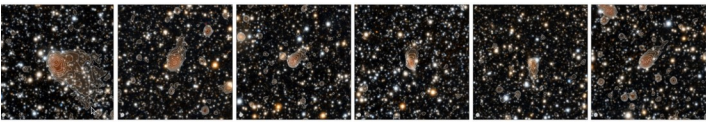
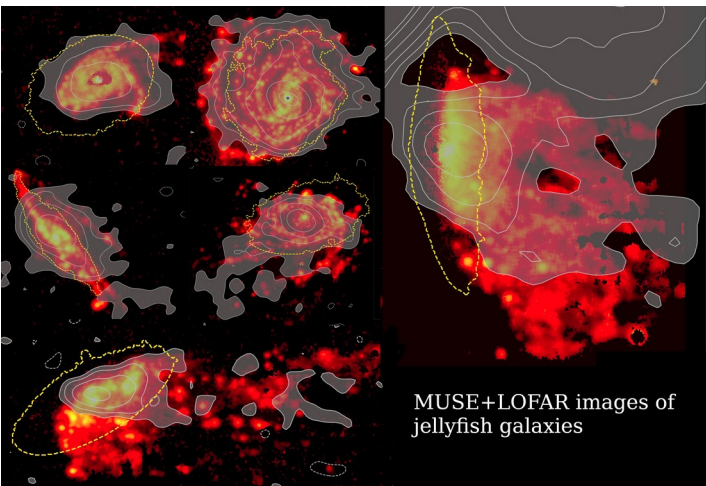




# Part 1: insights from the radio continuum emission

## Jellyfish galaxies in the radio sky

1<sup>st</sup> detection Gavazzi 1987 → ~200 (2025)



### Some references:

- Ignesti+2022, 2023
- Roberts+2021a,c, 2023
- Edler+2023
- Hu+2023
- Muller+2021
- Botteon+2025
- MeerKAT Cluster survey

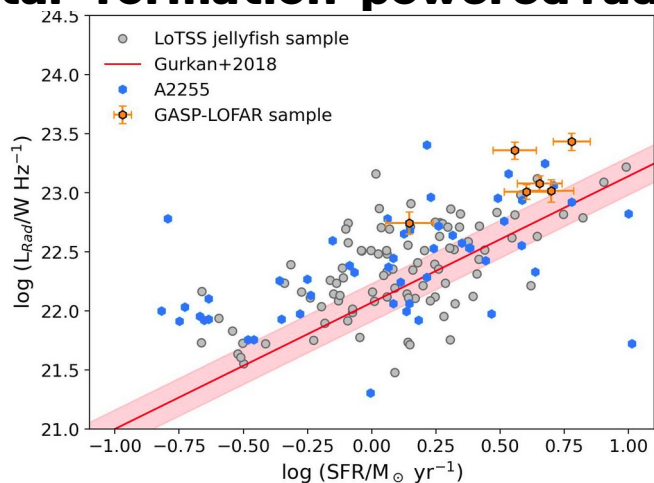


# Part 1: insights from the radio continuum emission

## Jellyfish galaxies in the radio sky

**JW39** [Ignesti+2022]  
 MUSE+LOFAR H $\alpha$   
 Radio continuum @144 MHz  
 Stellar continuum

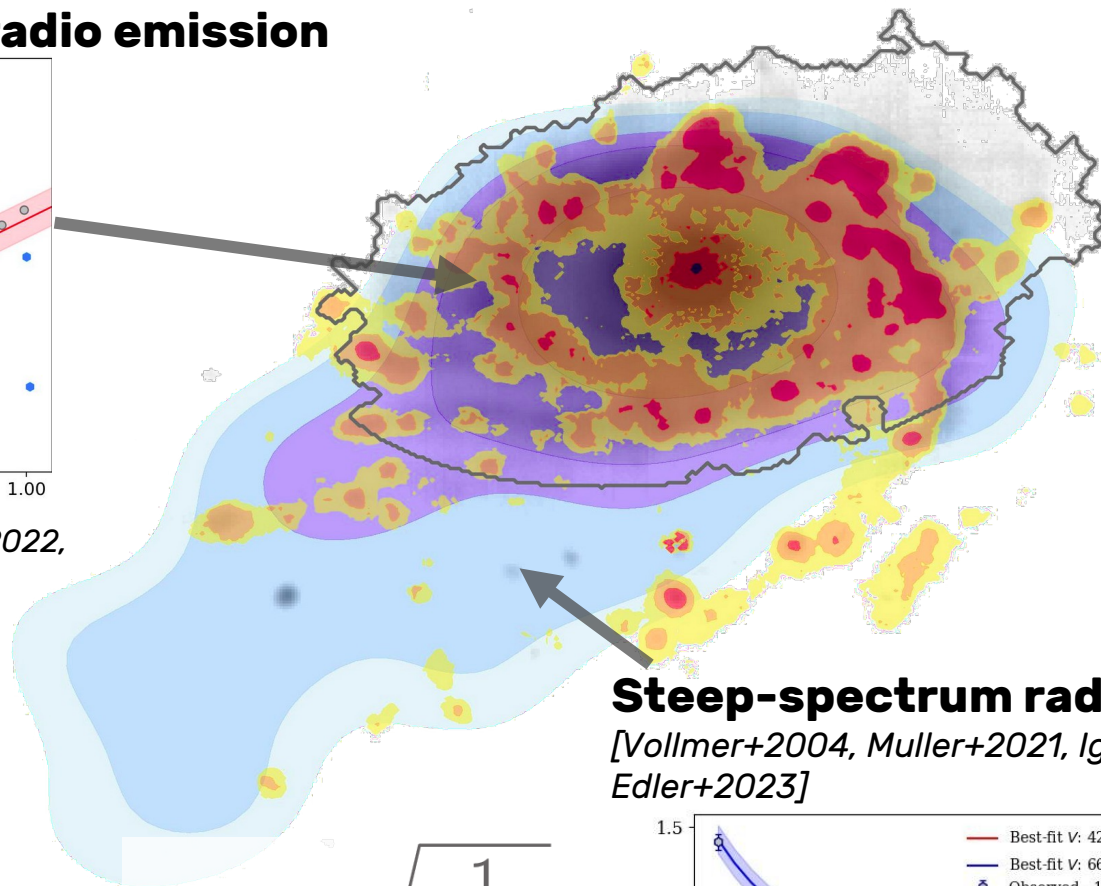
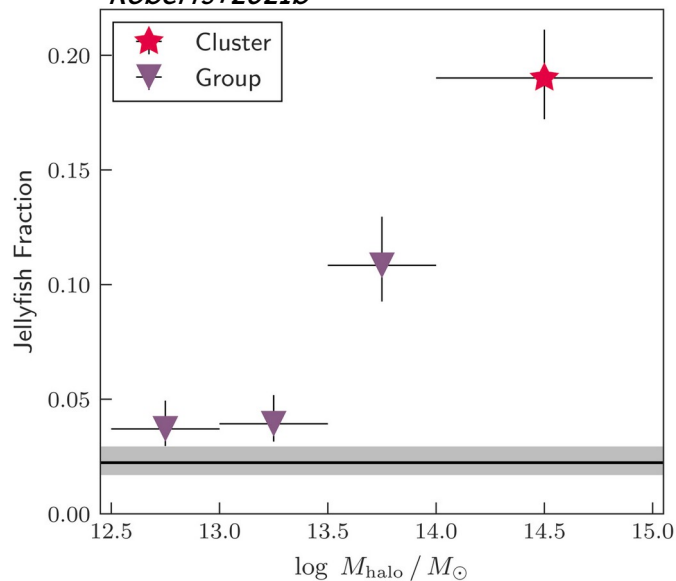
### Star-formation-powered radio emission



[Chen+2020, Roberts+2021, Ignesti+2022, Edler+2023]

### Groups vs Clusters

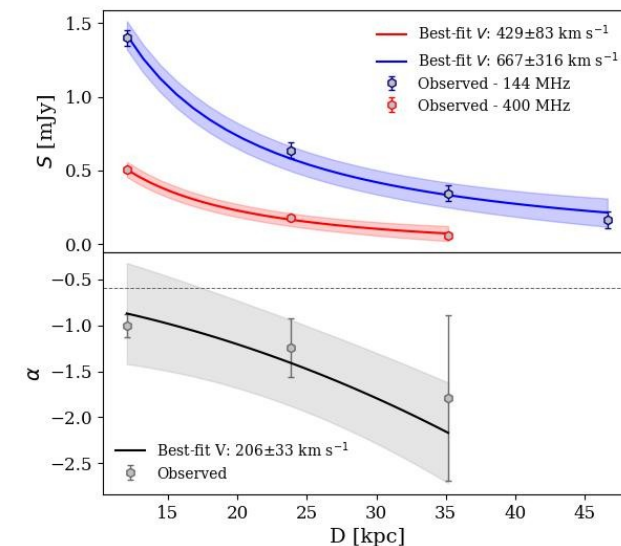
Roberts+2021b



### Steep-spectrum radio tail

[Vollmer+2004, Muller+2021, Ignesti+2022, Edler+2023]

$$L_{\text{tail}} \propto \sqrt{\frac{1}{\nu_{\text{obs}}}}$$

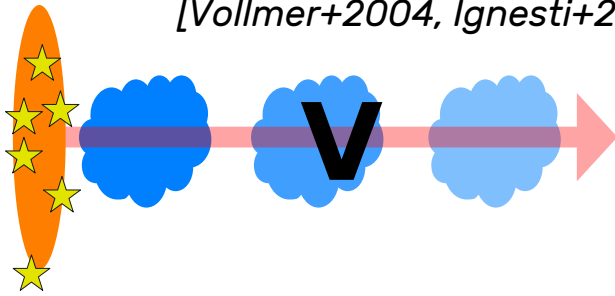


## Part 2: A crucial open question

# Magnetic tail

### Stripped ISM magnetic field

[Vollmer+2004, Ignesti+2023]

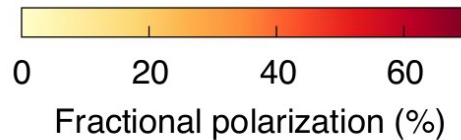


Fragmented radio tail mixed with thermal ISM

→ **Low/no polarized emission**

### ICM magnetic draping

[Sparre+2020,2023, Muller+2021]



*Sparre+2020*

Large-scale ordered magnetic drape

→ **High polarized emission fraction**

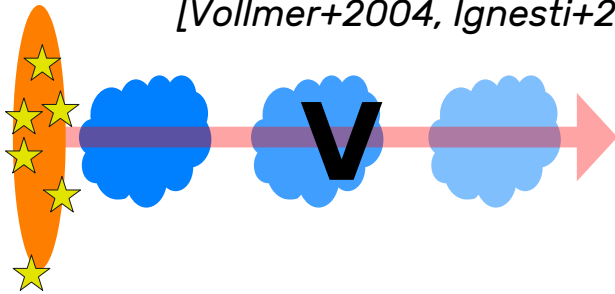
→ **Magnetic drape should regulate stripped ISM evolution**

## Part 2: A crucial open question

# Magnetic tail

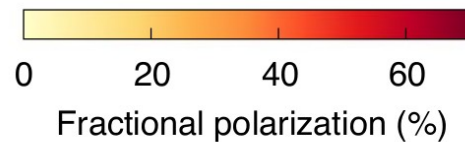
### Stripped ISM magnetic field

[Vollmer+2004, Ignesti+2023]



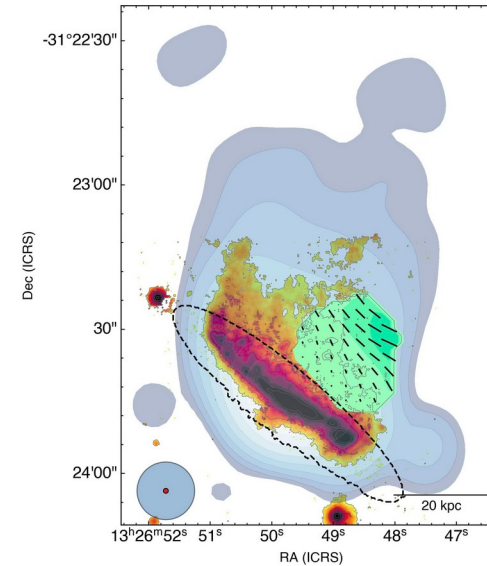
### ICM magnetic draping

[Sparre+2020,2023, Muller+2021]

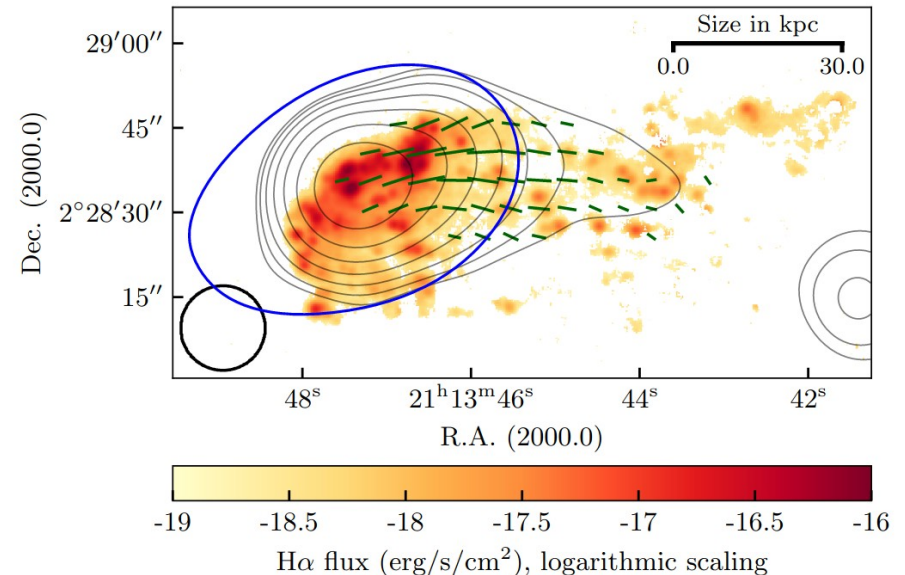


*Sparre+2020*

### Polarized tail in J0147 (Ignesti+, submitted)



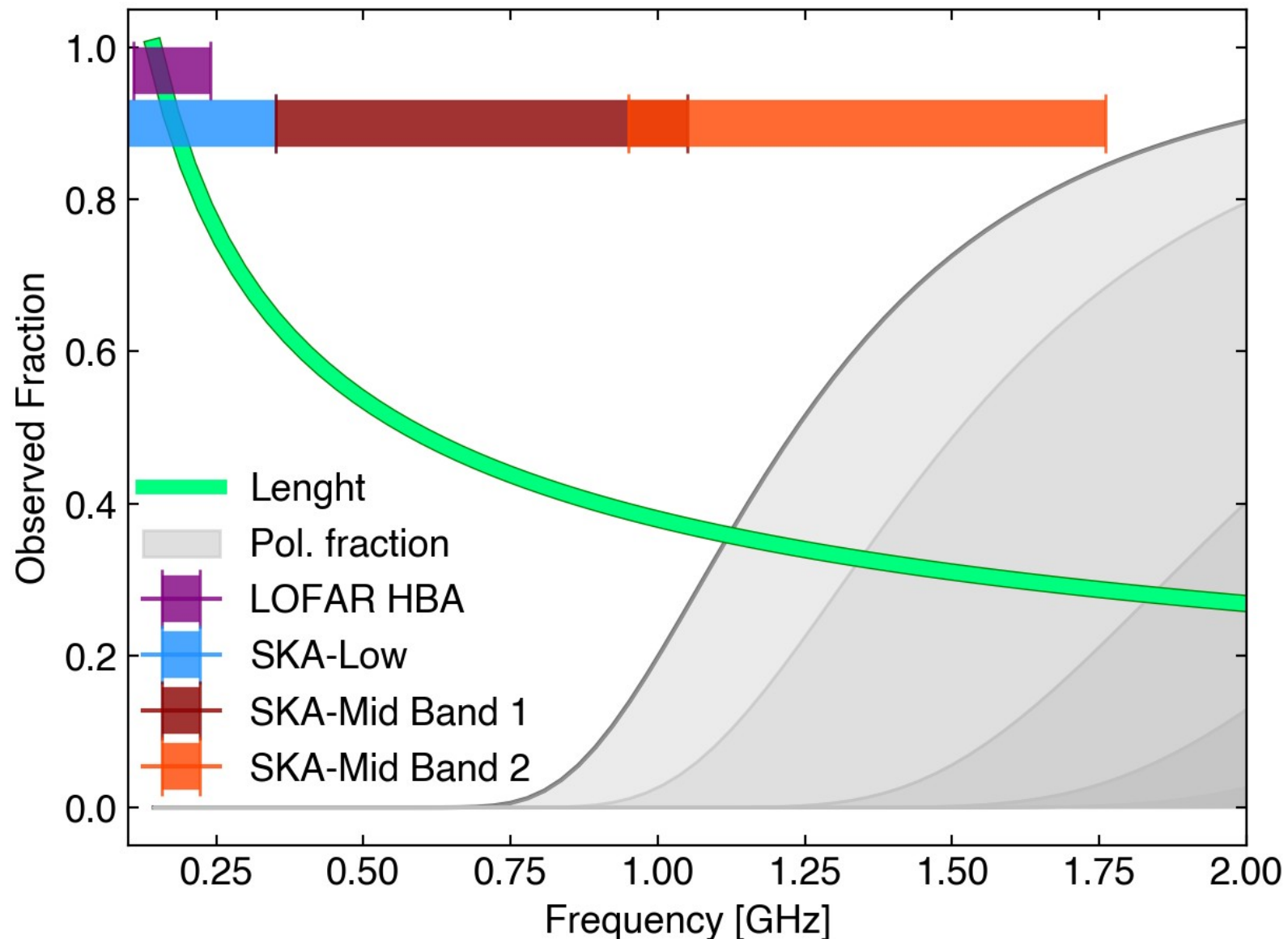
### Muller+2021: first magnetized drape detection in J0206



→ We need (a lot) more statistics!



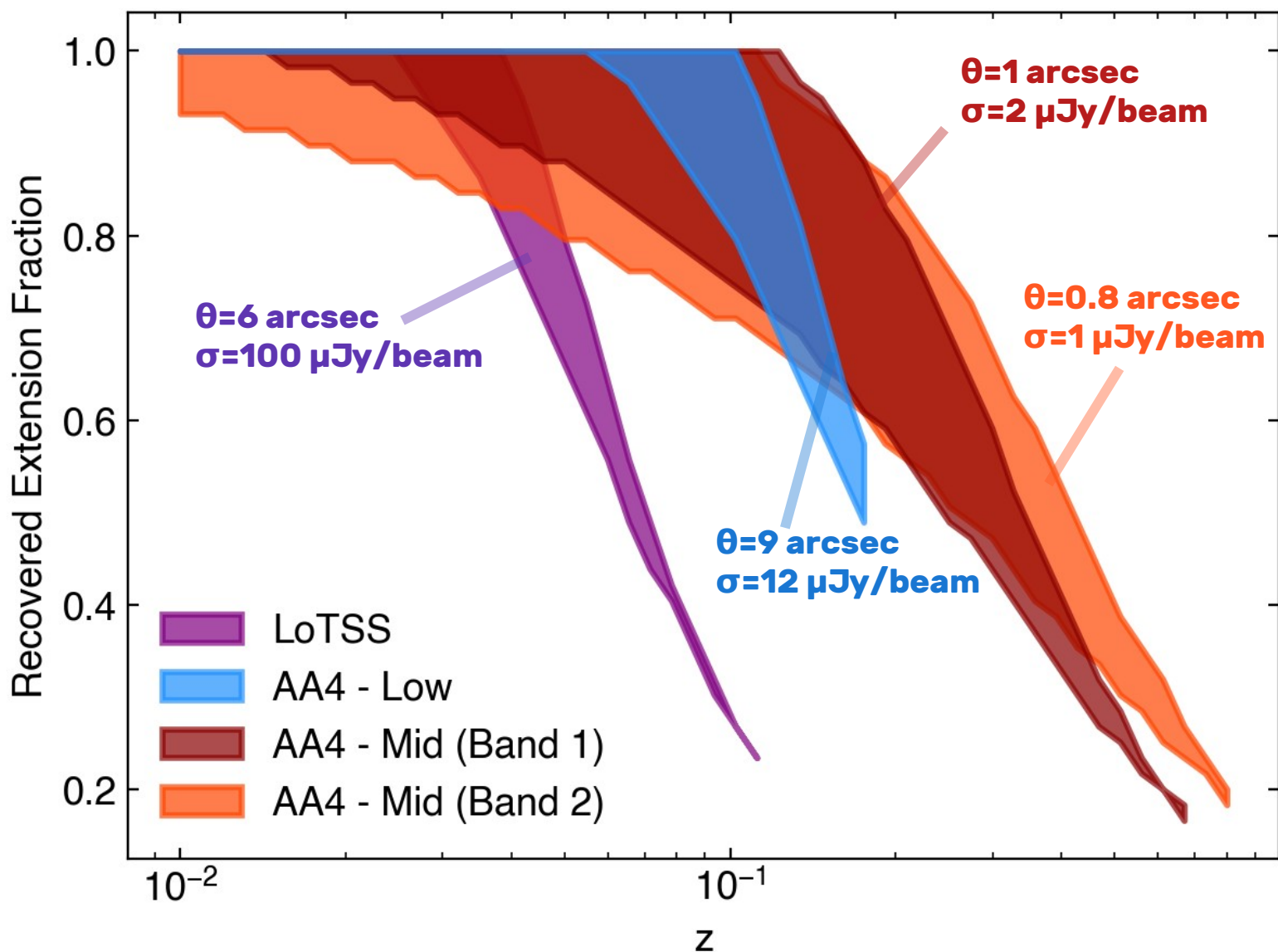
### Part 3: the SKA era



- **SKA-Low the RPS hunter**: it will detect hundreds of RPS candidates in the Southern sky → follow up with the Southern observatories
- **SKA-Mid the magnetic field inspector**: it will be our best instrument to unveil JF galaxies magnetic field structure

### Part 3: the SKA era

#### Opening the “high” redshift regime



SKA-Mid will greatly expand the cosmic volume for our studies, opening the “high redshift” era

# Summary and future prospects

- Jellyfish galaxies are excellent laboratories to study baryon physics, or how the **ISM evolves under extreme conditions**
- Radio continuum observations are now focusing on their **complex magnetic fields**
- LOFAR has been great, SKA will be better!
  - SKA-LOW has a **huge exploration potential** in the southern sky+Great synergy with southern observatories
  - SKA-MID will address the open questions with **deep polarimetry surveys on a larger cosmological volume**
  - RPS galaxies studies are excellent ancillary science for groups and clusters observations
  - **Check the SKA Science book chapter!**

