

13 June 2023, LOFAR family meeting

The LBA view of the **Coma** galaxy cluster

Chiara Stuardi

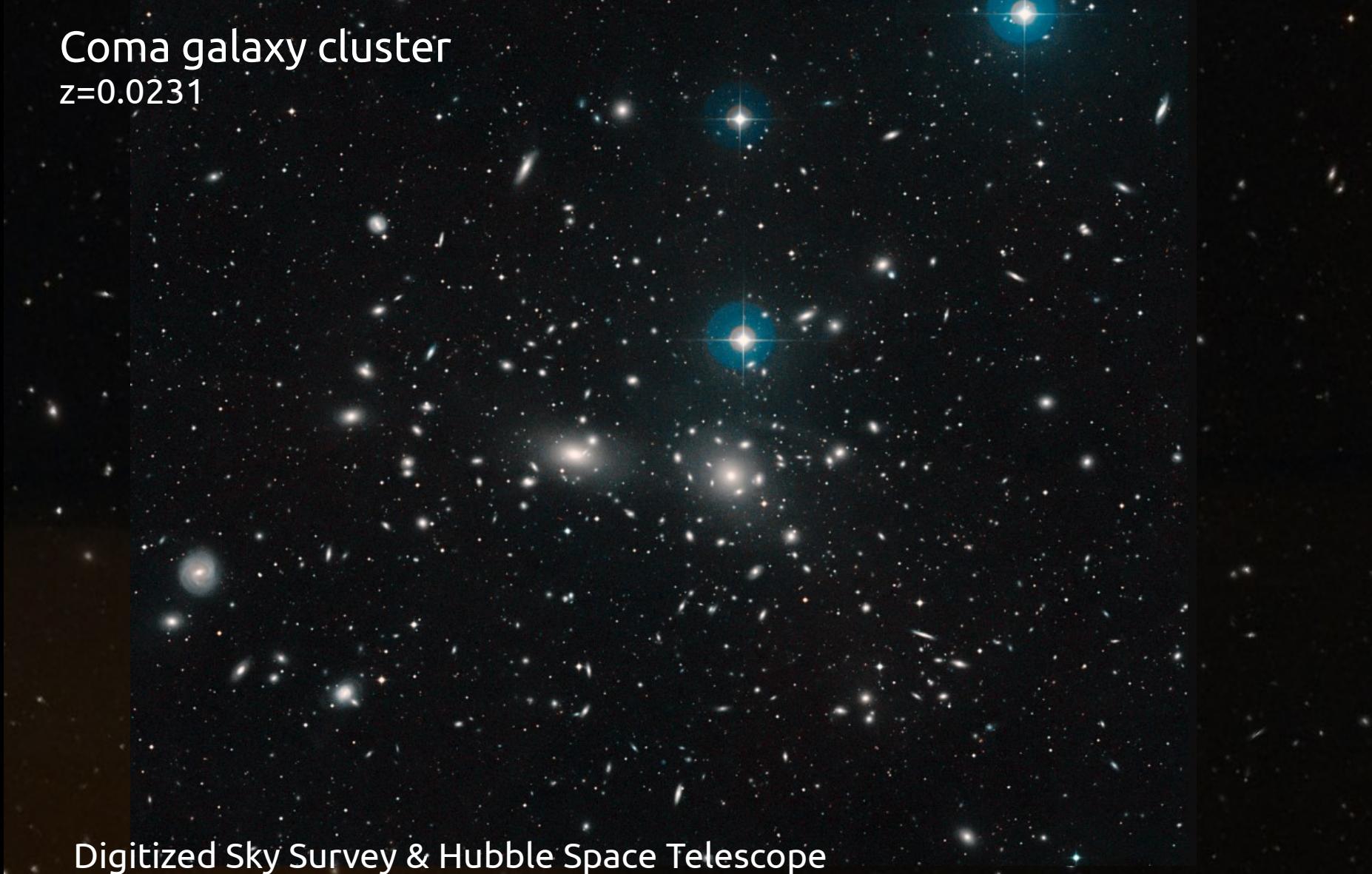
Postdoctoral researcher

@ University of Bologna & INAF - Istituto di Radioastronomia (Italy)

Collaborators: A. Bonafede, F. De Gasperin and many more

Coma galaxy cluster

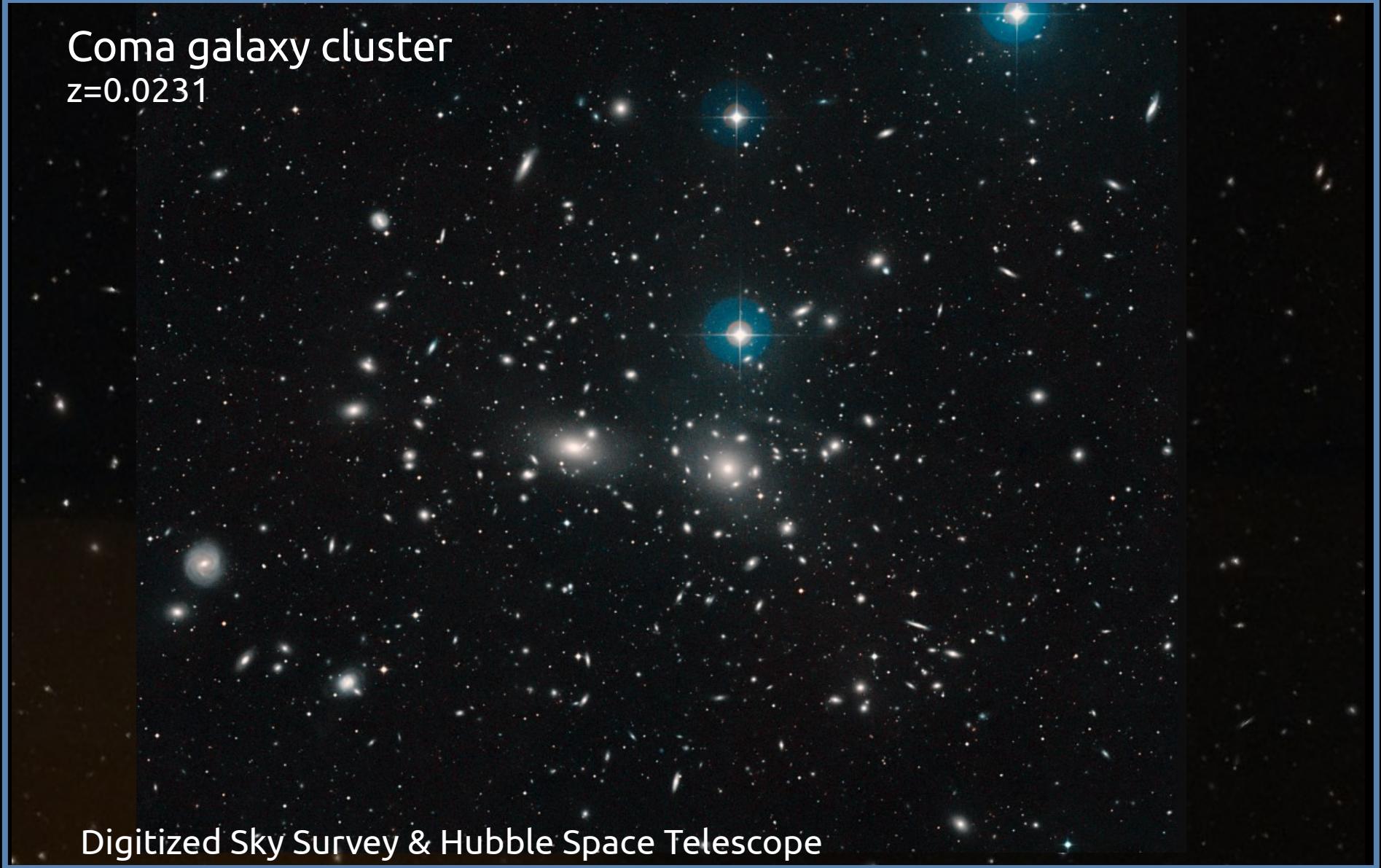
$z=0.0231$



Digitized Sky Survey & Hubble Space Telescope

Coma galaxy cluster

$z=0.0231$



Digitized Sky Survey & Hubble Space Telescope

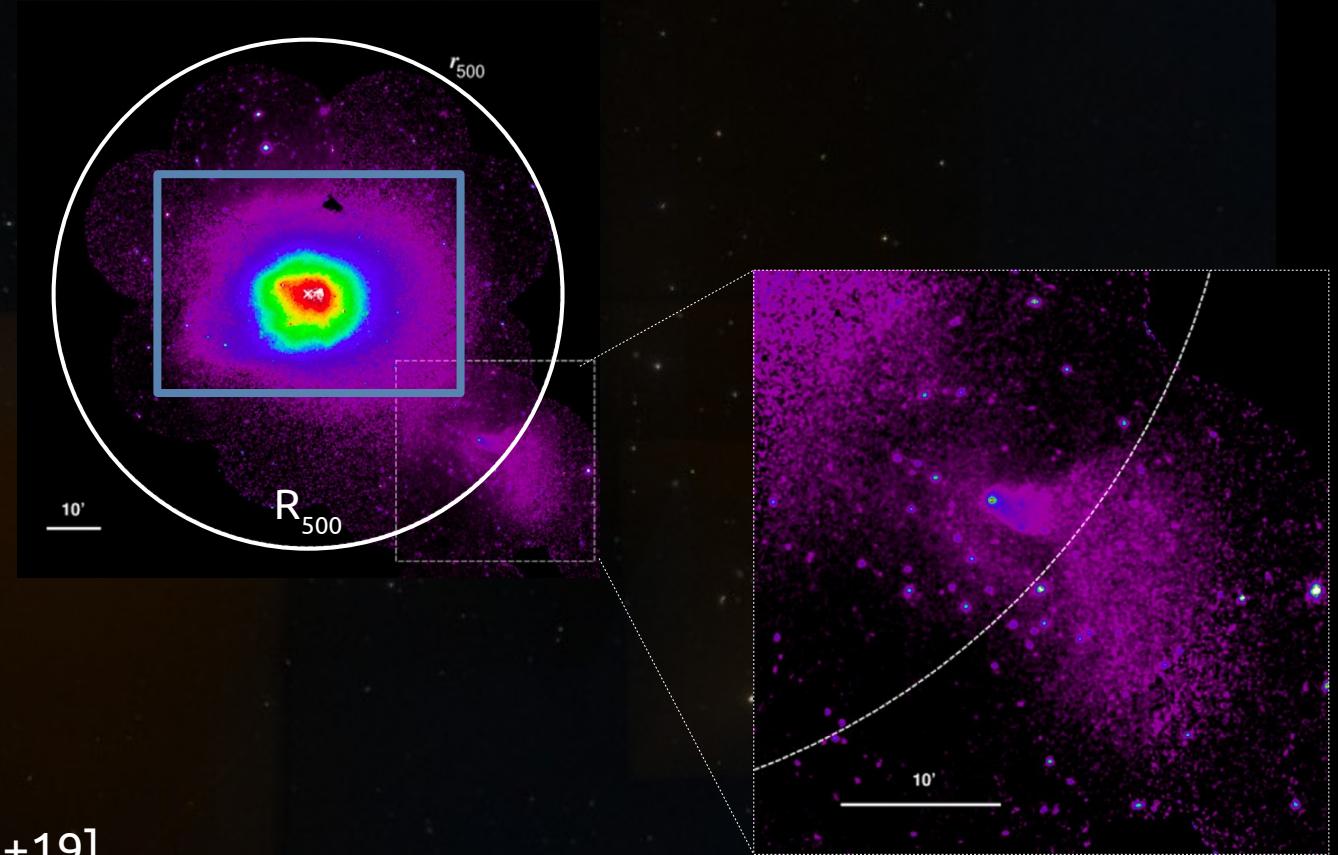
Coma galaxy cluster

$R_{500} \sim 47' \sim 1.32 \text{ Mpc}$



Coma galaxy cluster

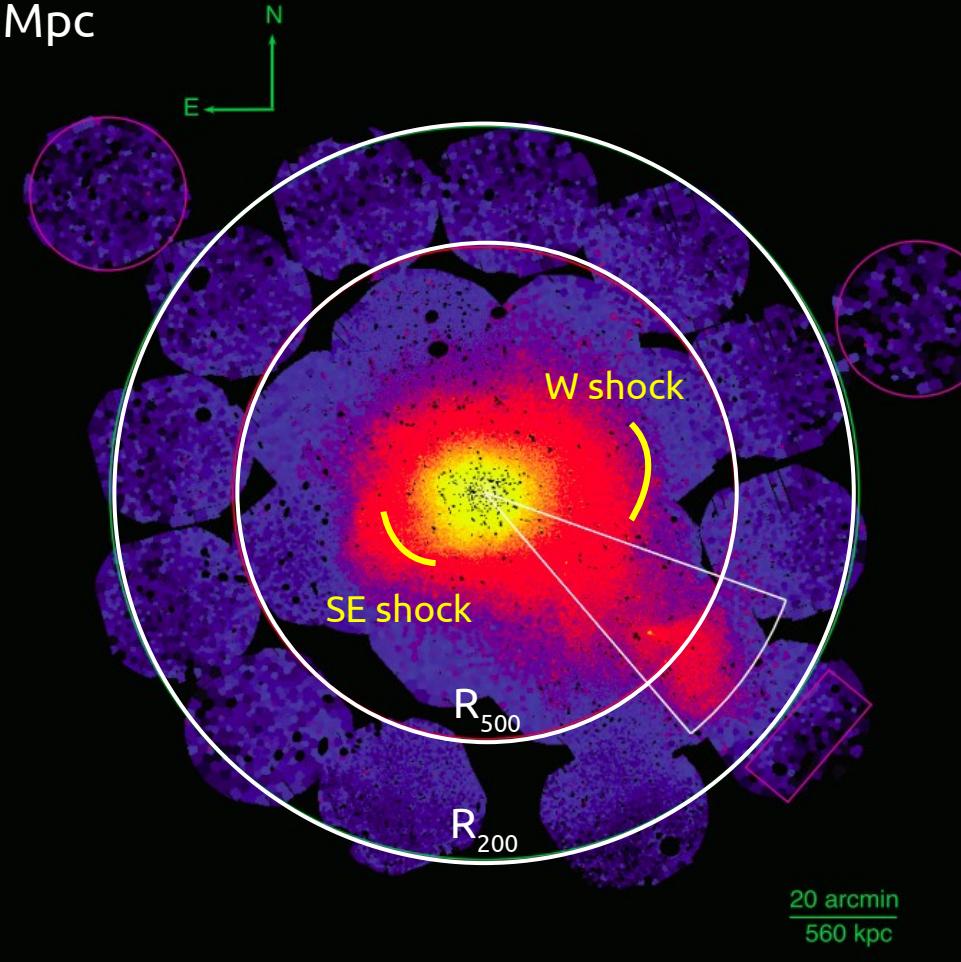
$M \sim 6 \times 10^{14} M_\odot$



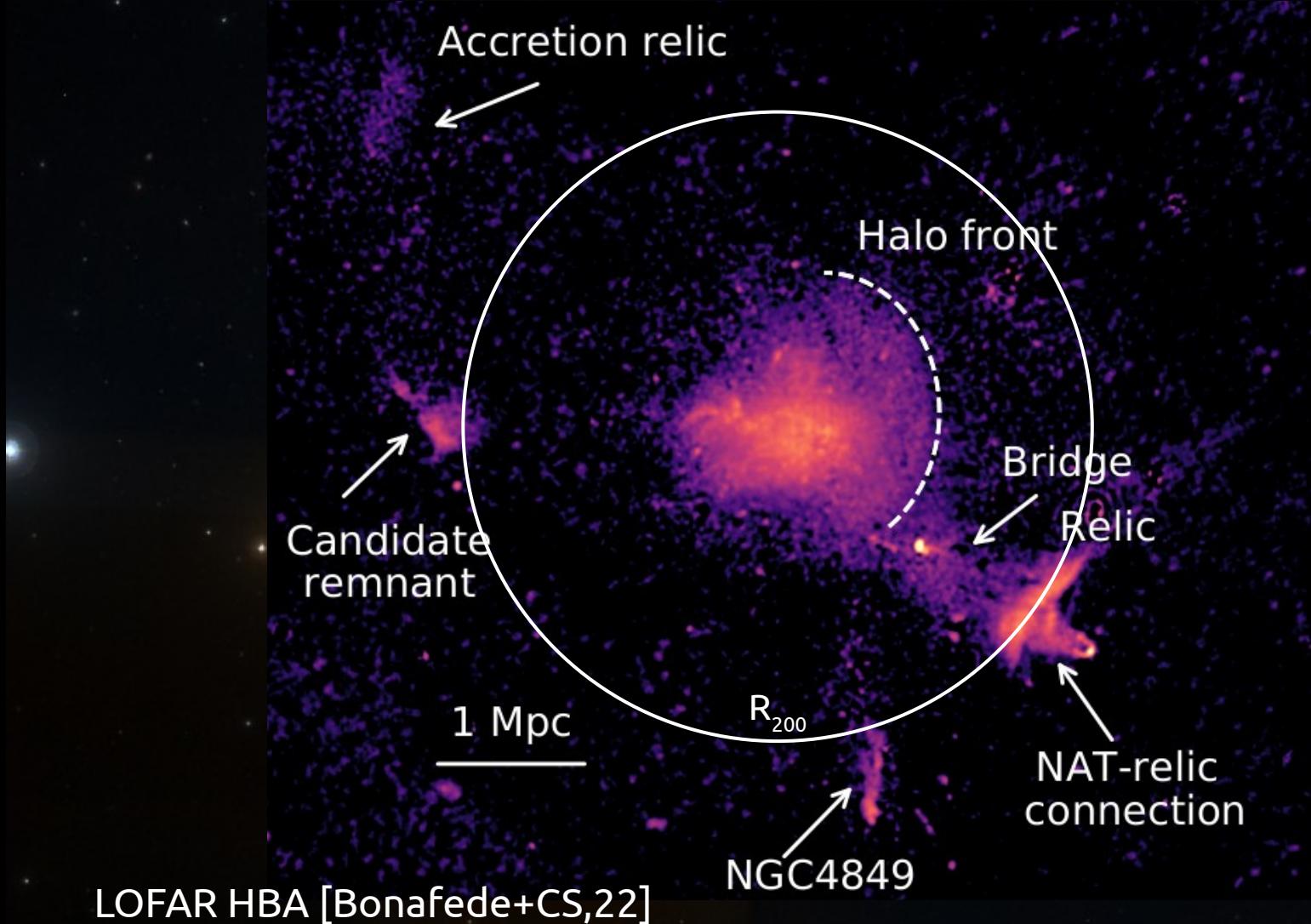
XMM-Newton [Lyskova+19]

Coma galaxy cluster

$R_{200} \sim 70' \sim 1.96 \text{ Mpc}$



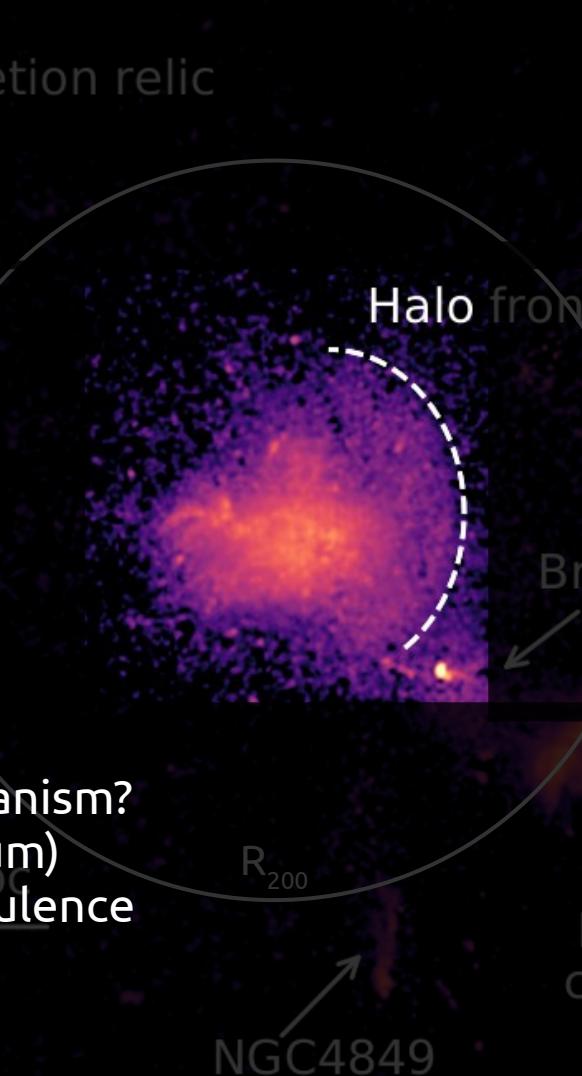
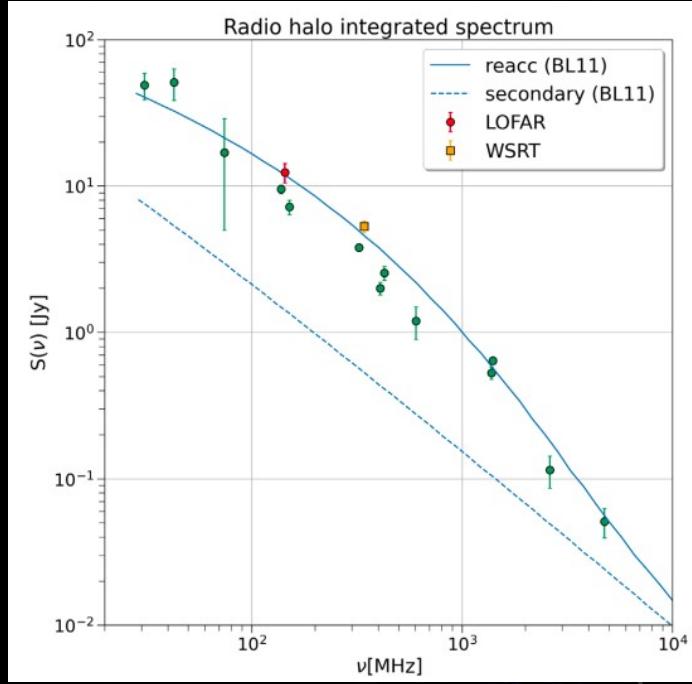
Coma galaxy cluster



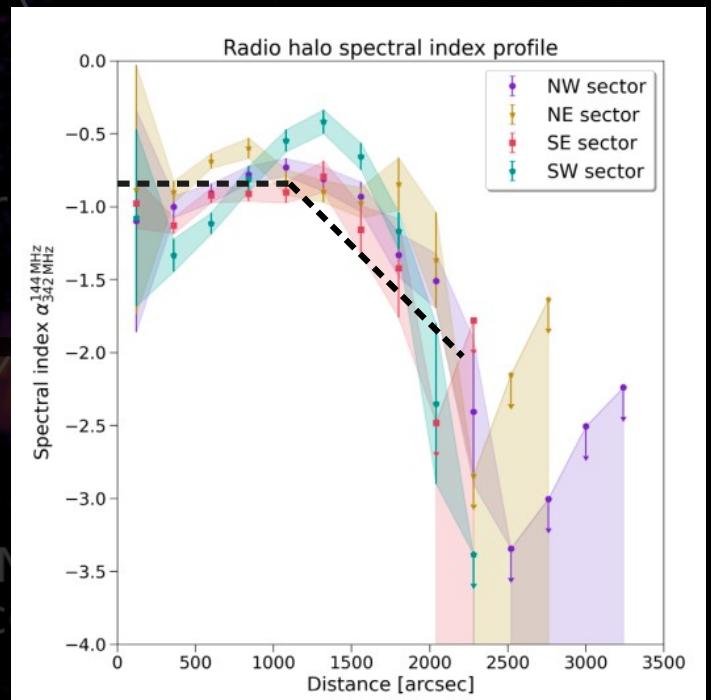
"An in deep view of the Coma galaxy cluster at 54 MHz"

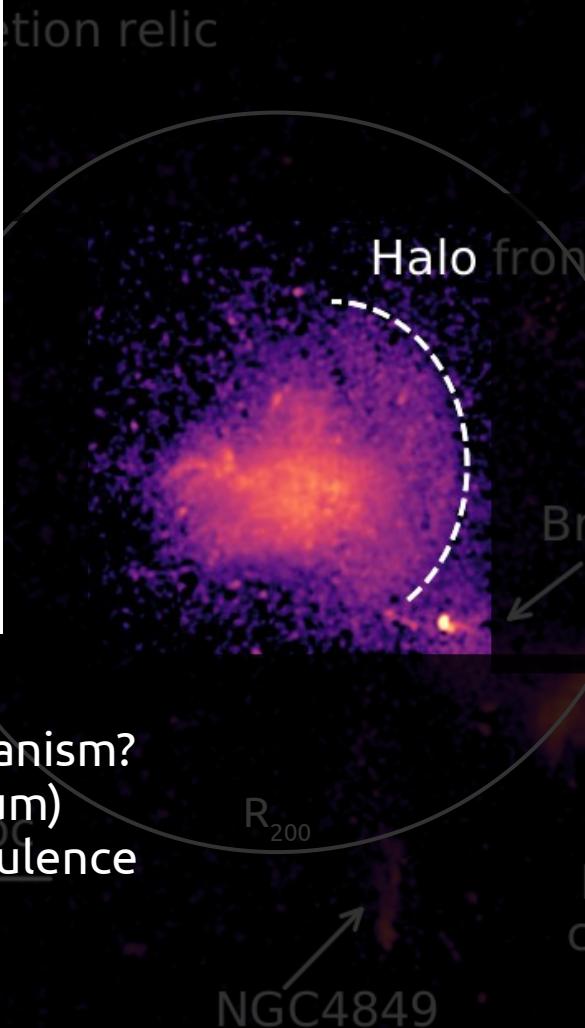
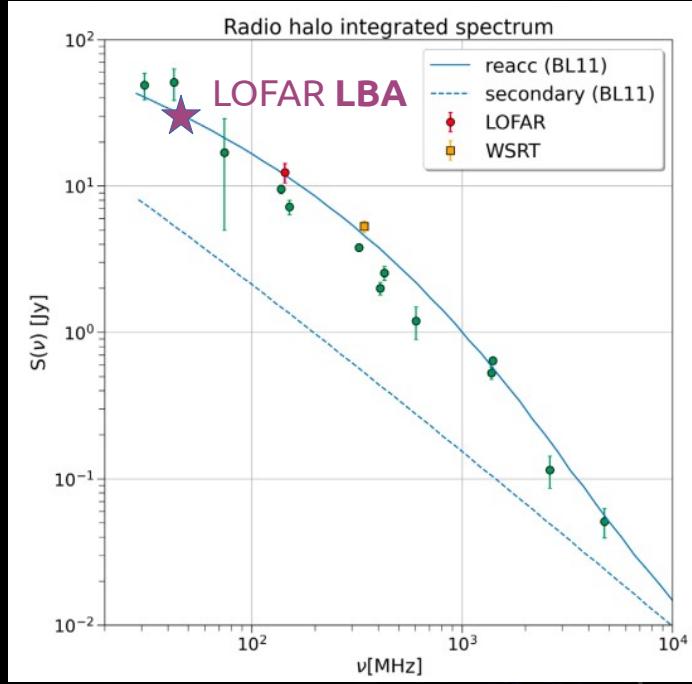
(LOFAR call for proposals 2022)

- 108 hours with LBA @ 54 MHz
- Co-observed with LoLSS
- Aim: detailed spectral index study (with HBA)
 - halo
 - halo front
 - bridge
 - accretion relic

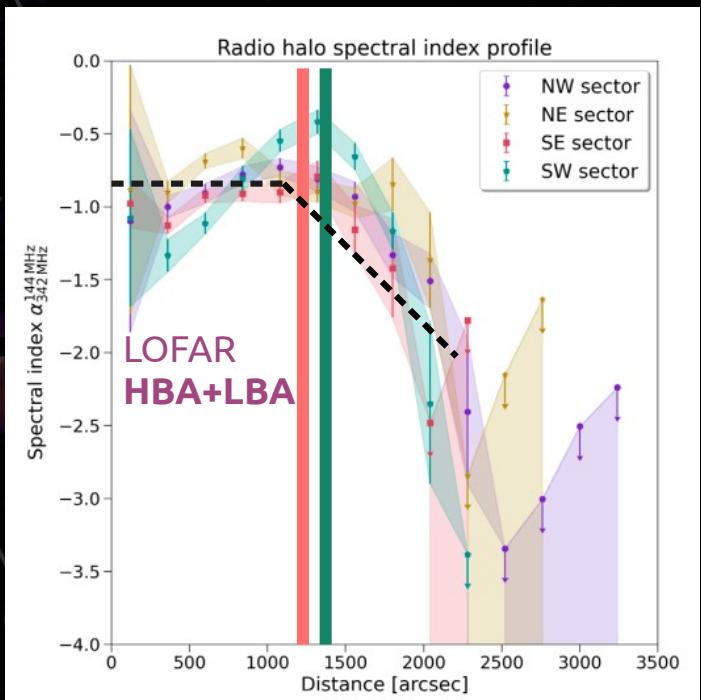


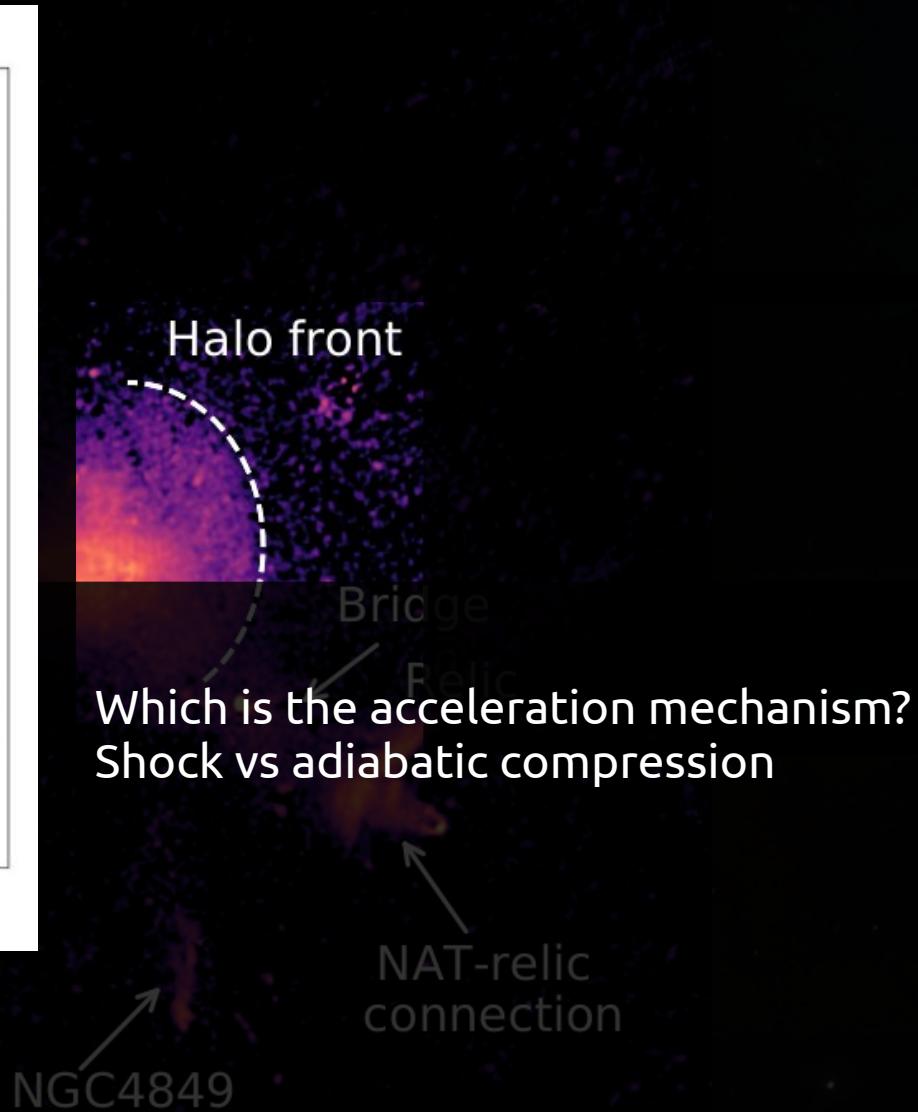
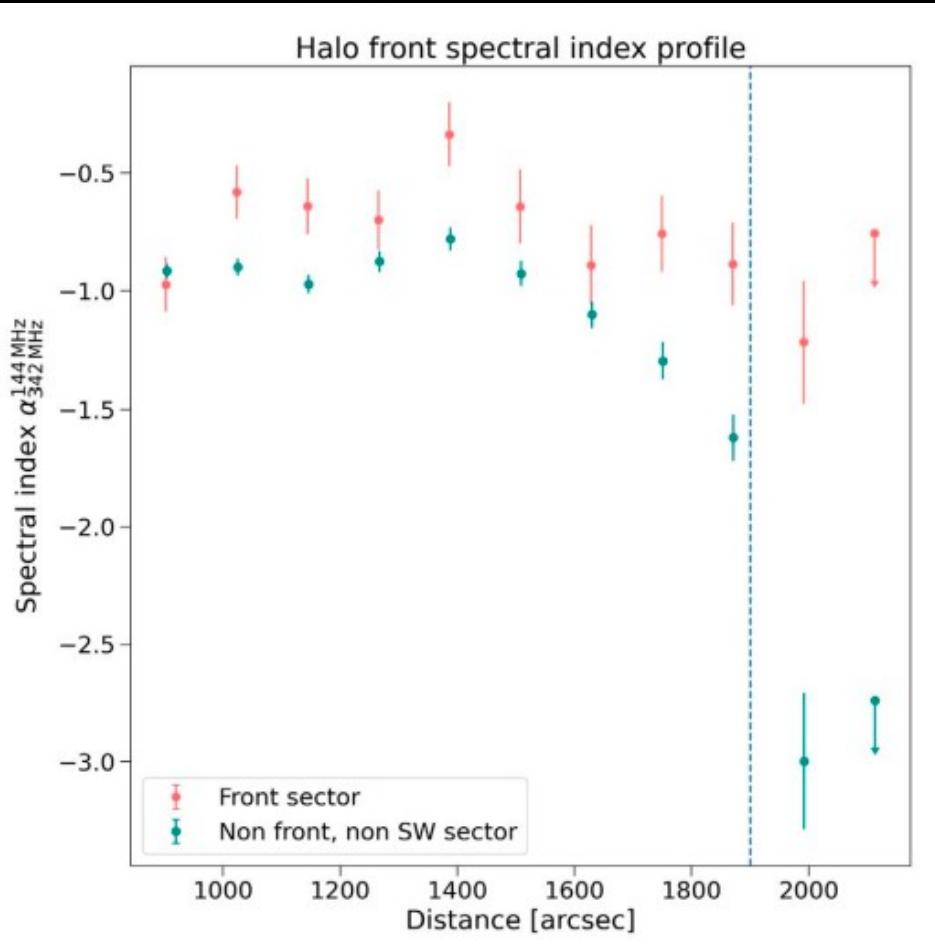
Which is the acceleration mechanism?
Re-acceleration (curved spectrum)
Compressive vs solenoidal turbulence

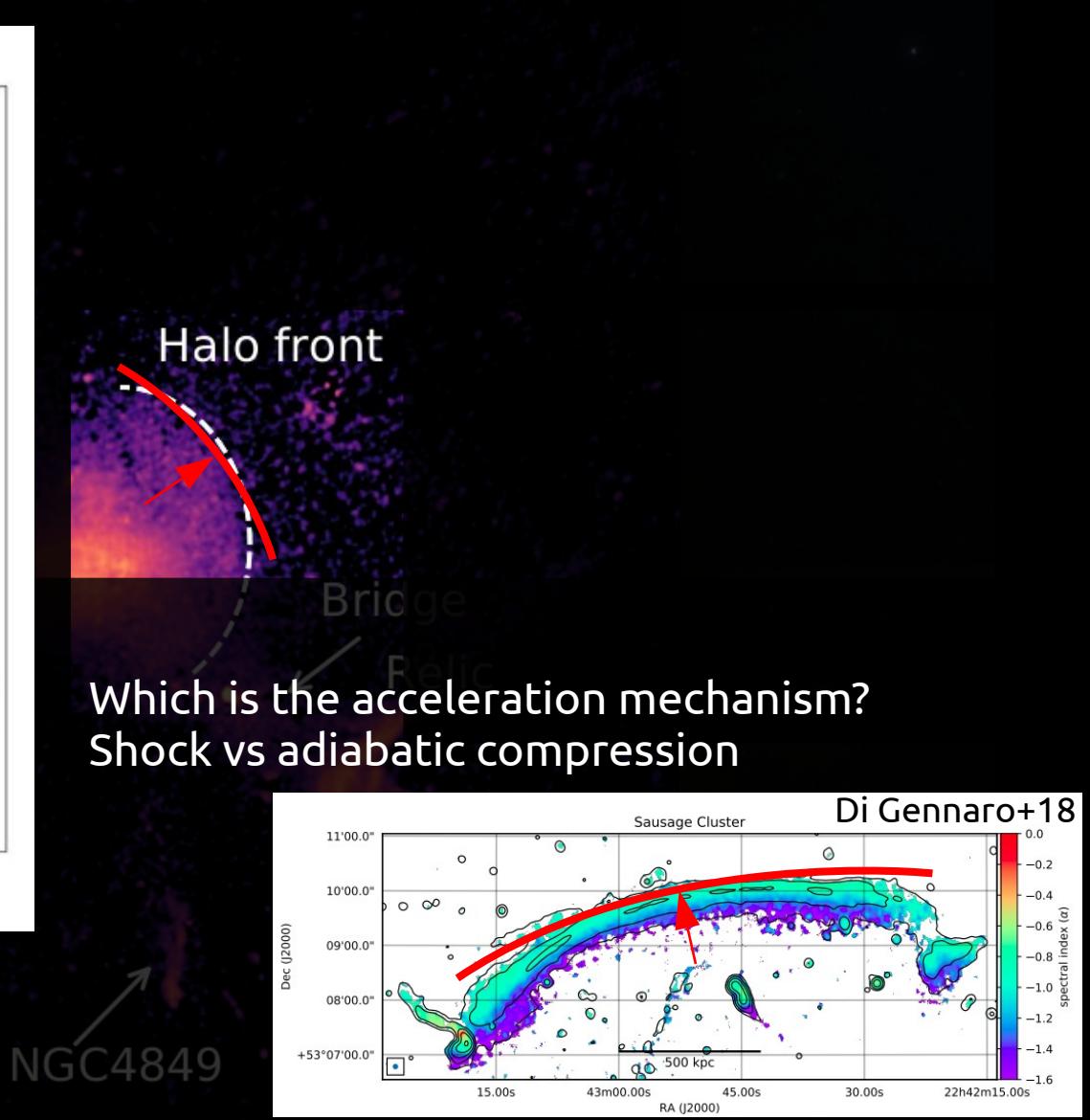
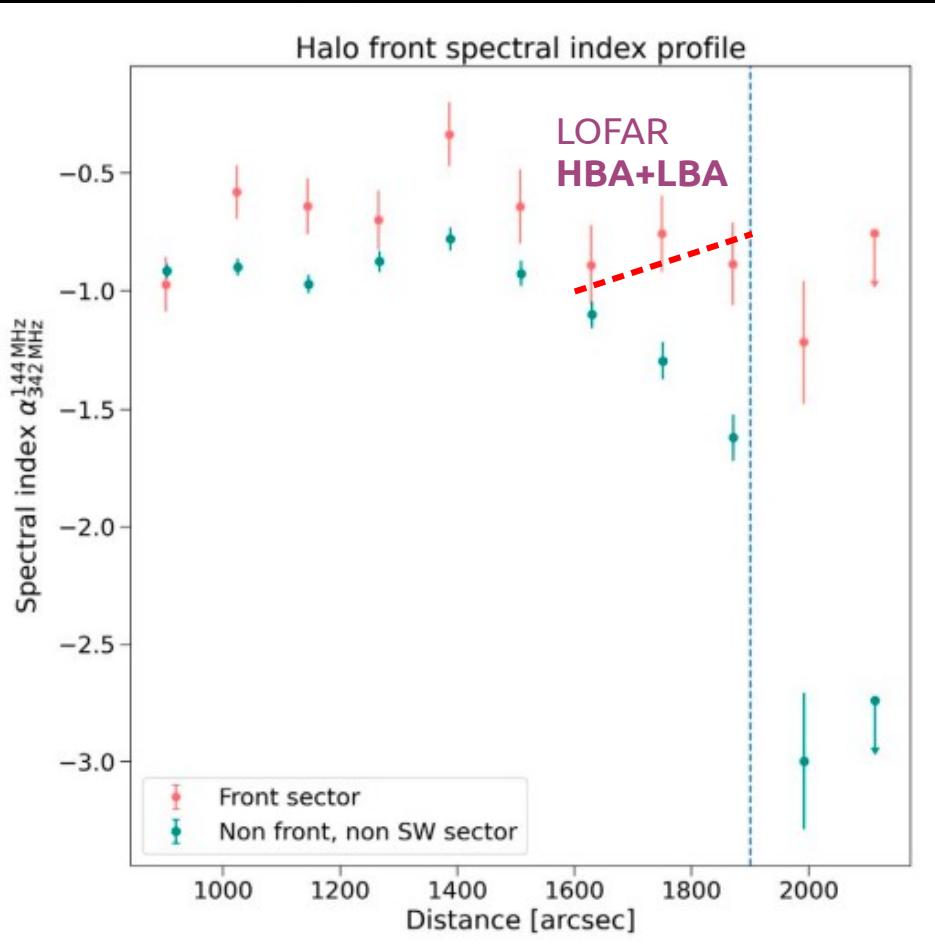




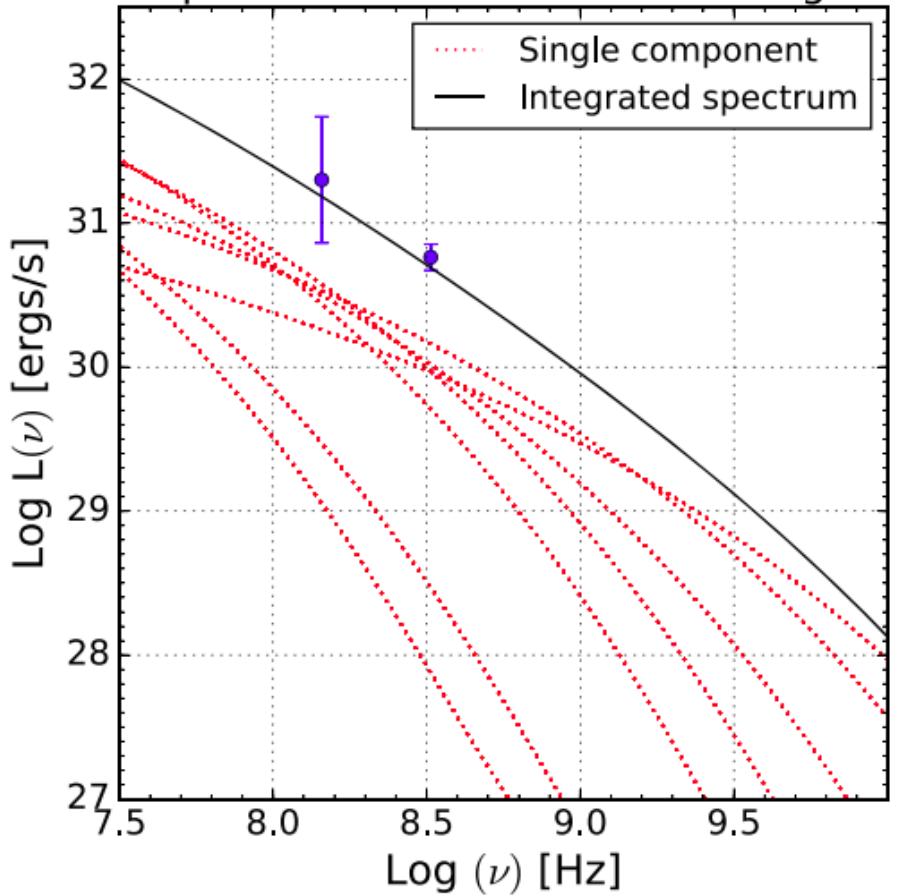
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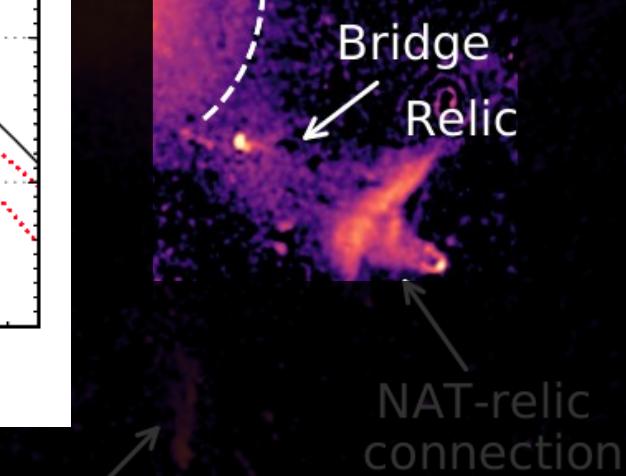
Spectrum of the simulated bridge



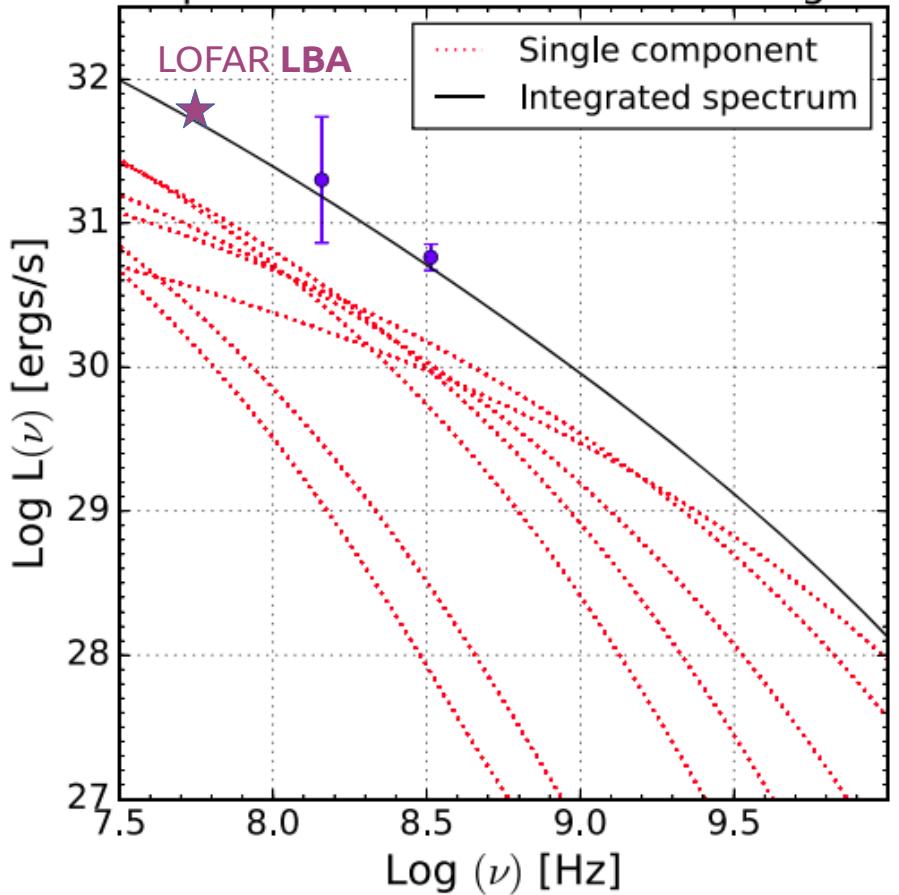
Halo front

Which is the acceleration mechanism?
Turbulent re-acceleration predicts $\alpha \sim 1.5$

NGC4849



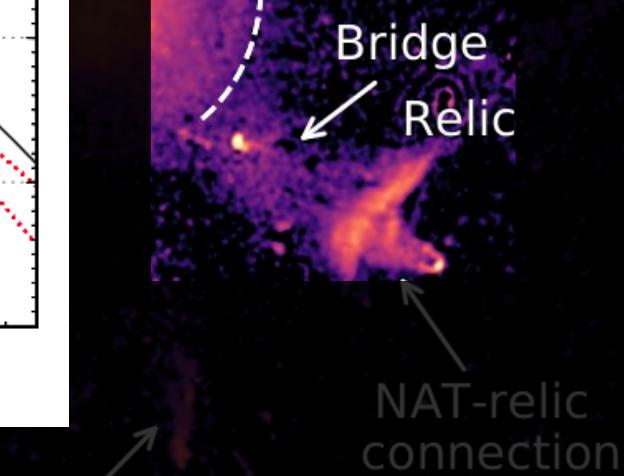
Spectrum of the simulated bridge

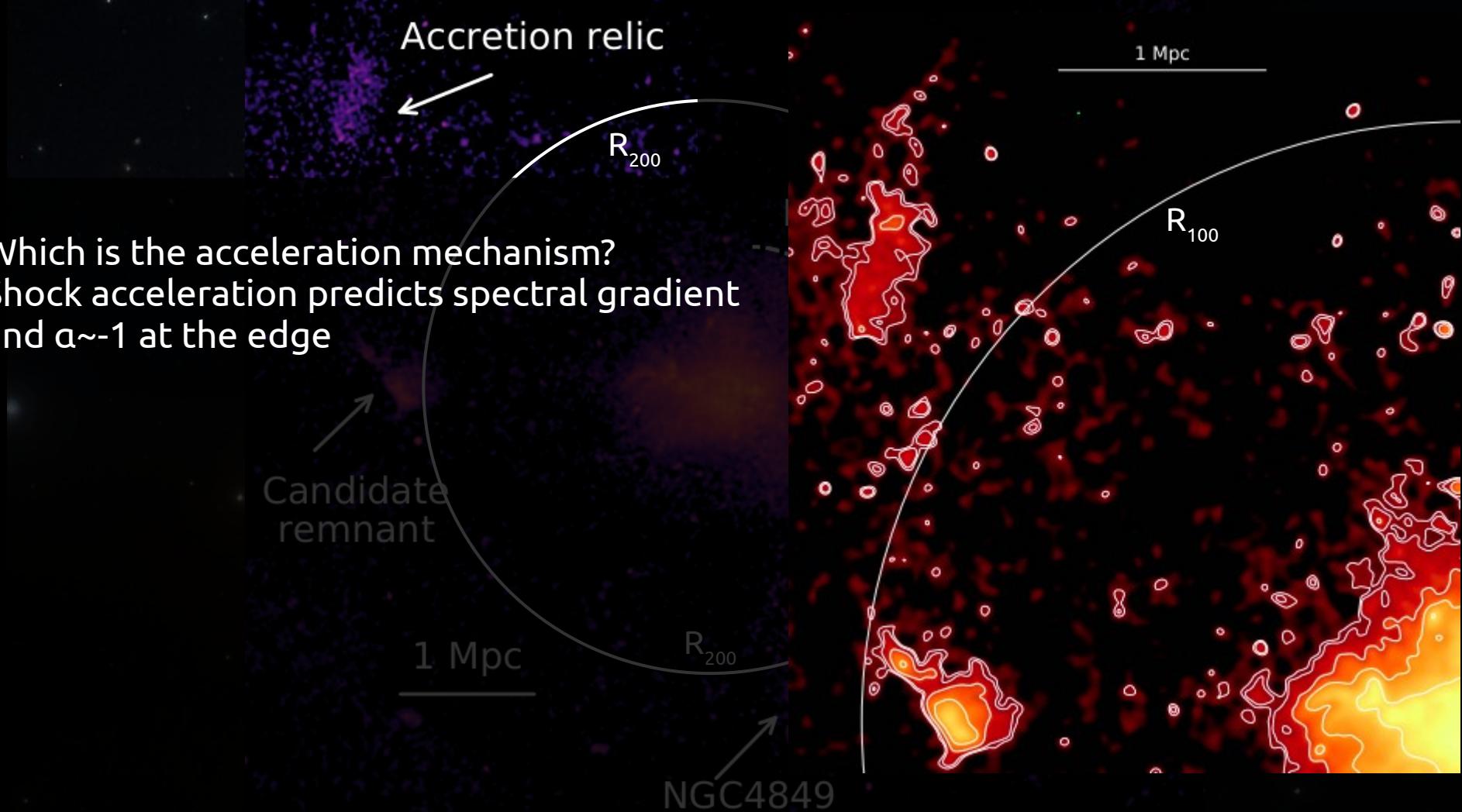


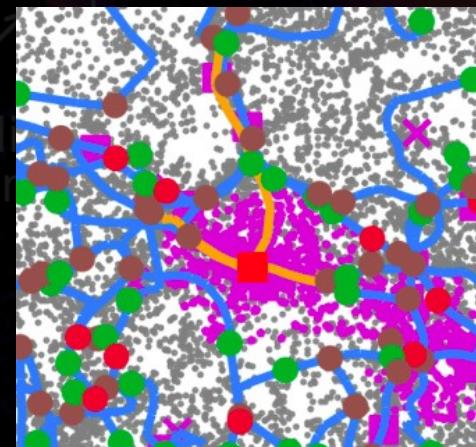
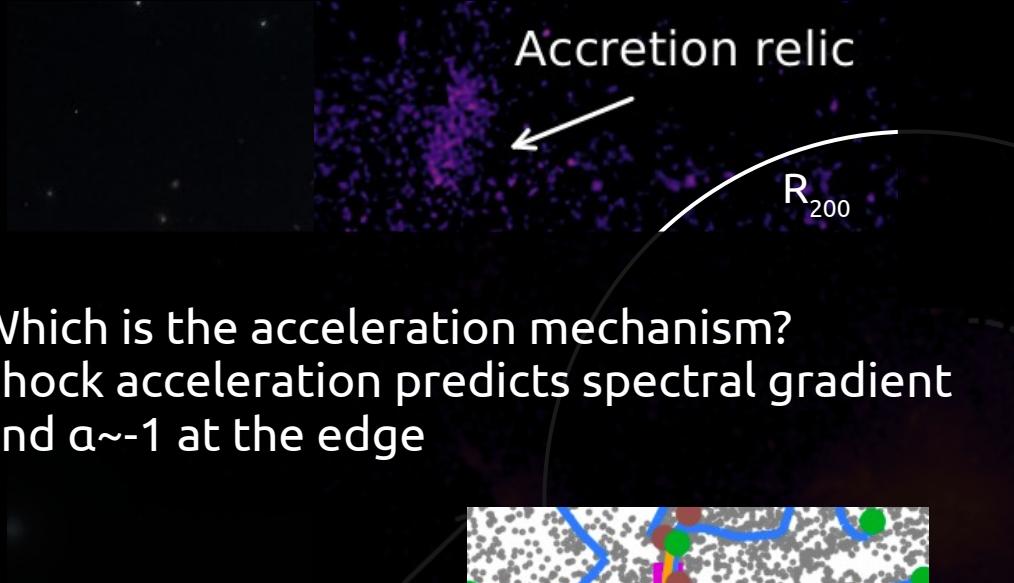
Halo front

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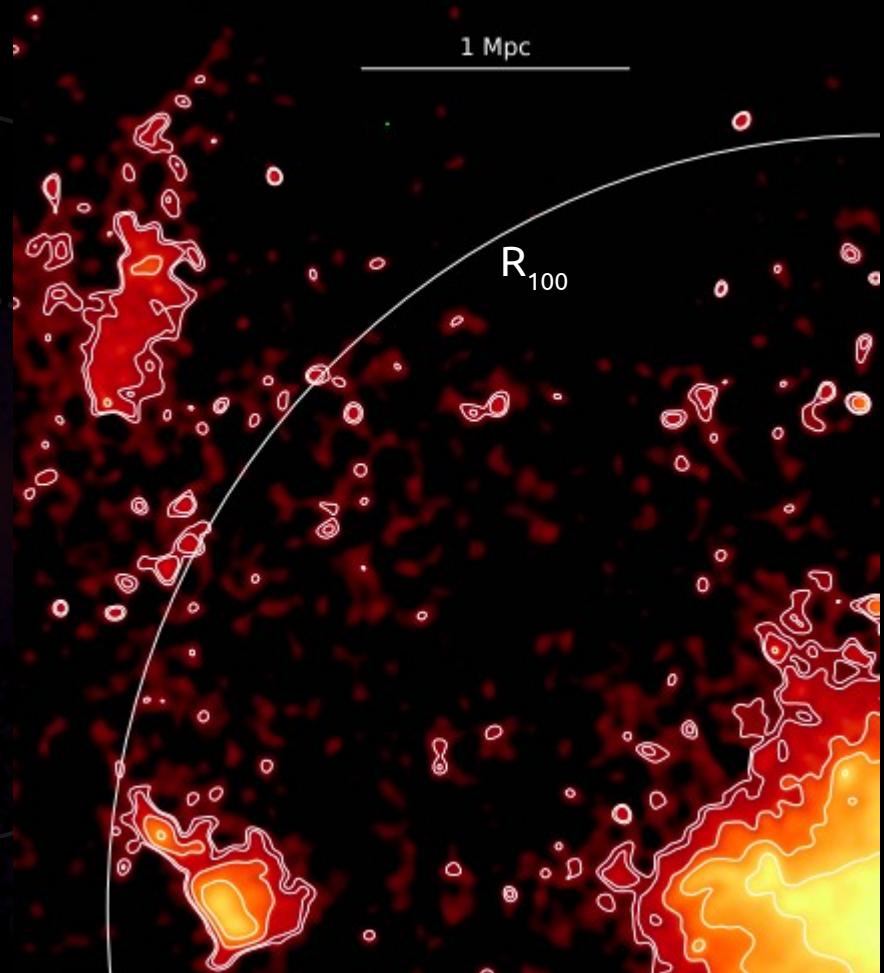
NGC4849



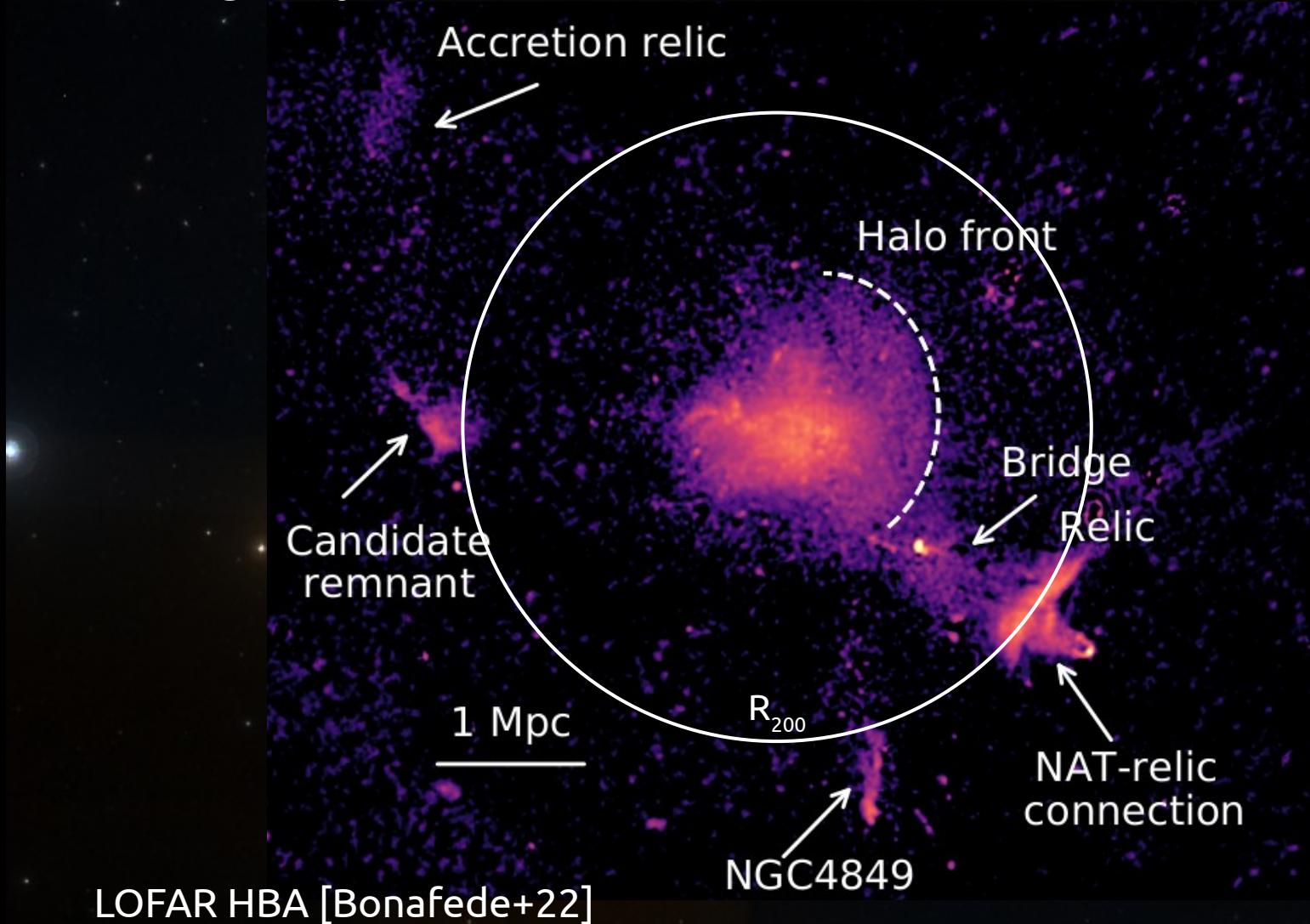




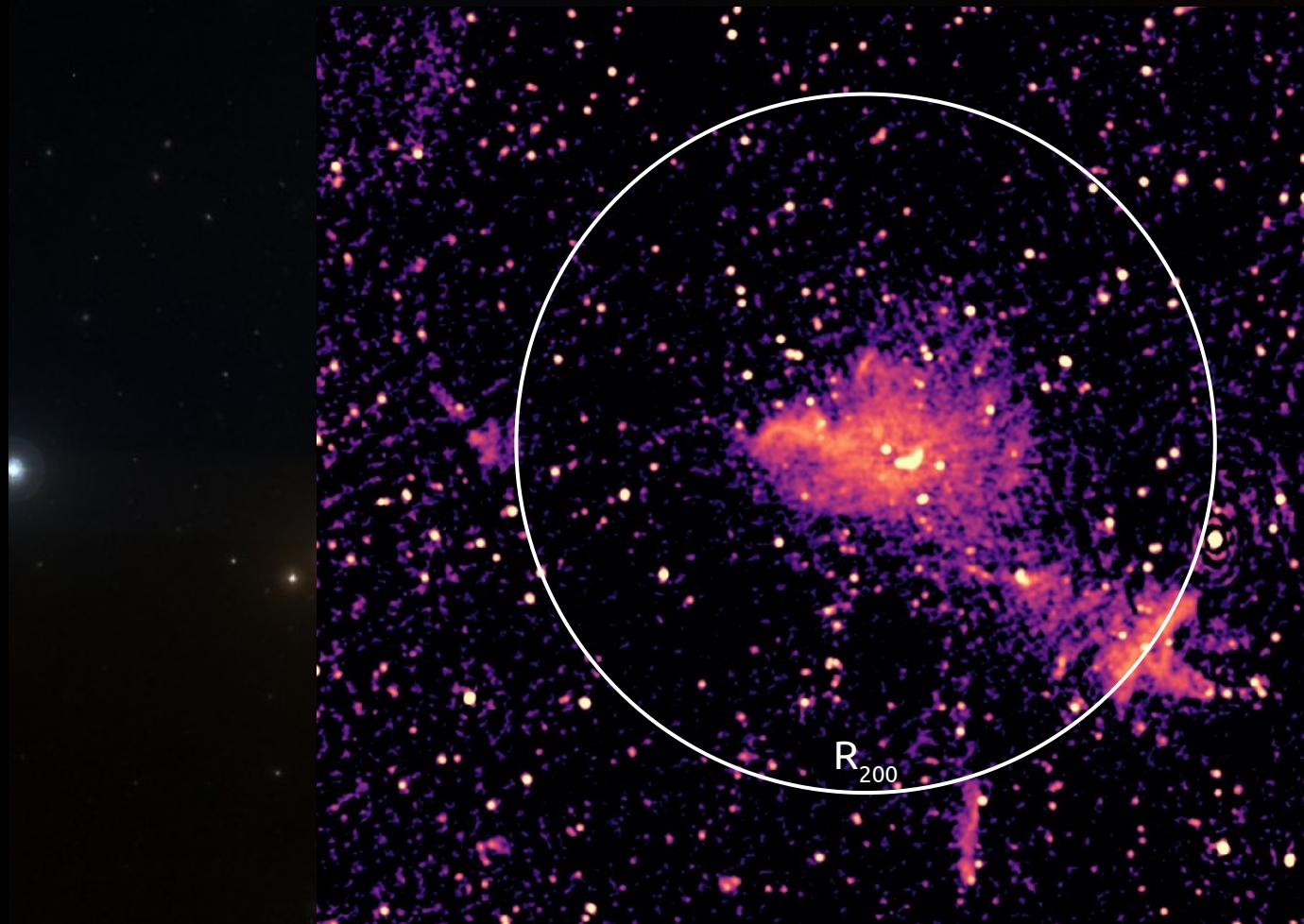
NGC4849



Coma galaxy cluster



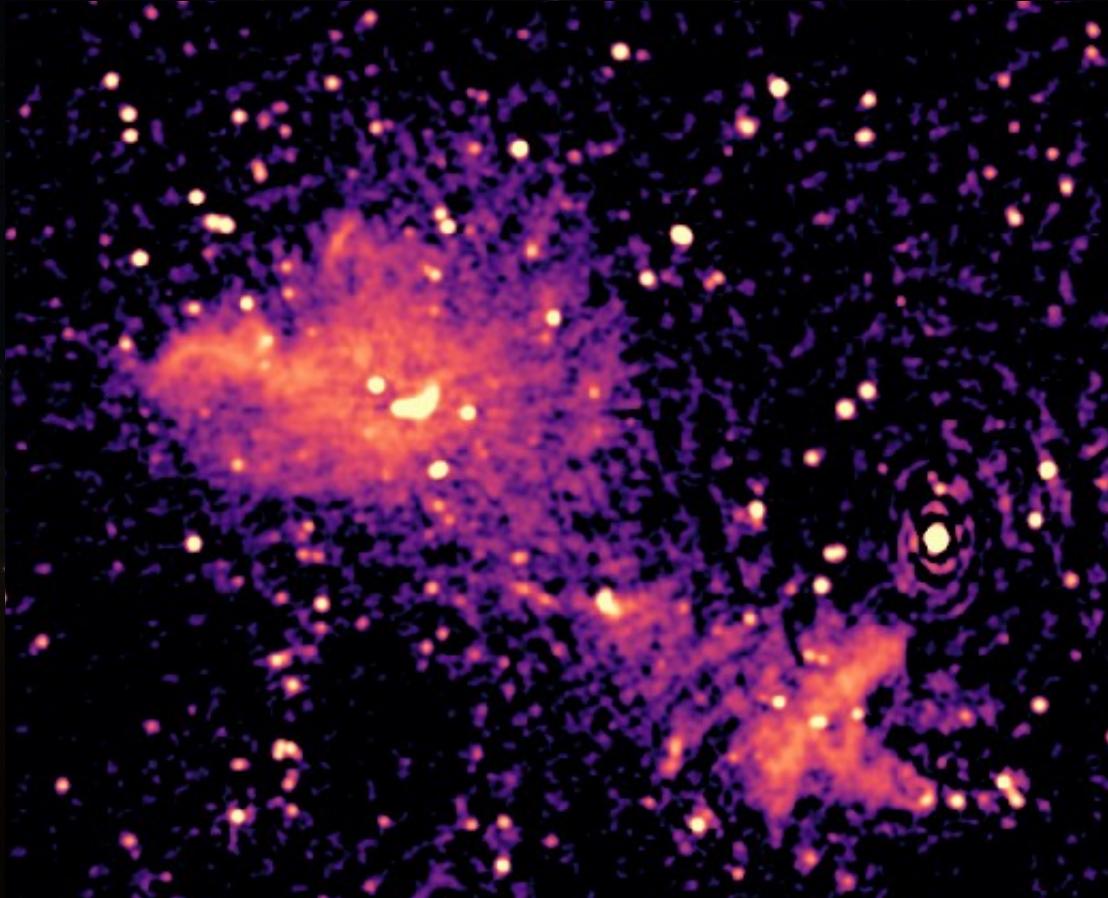
Coma galaxy cluster



LOFAR LBA [preliminary]

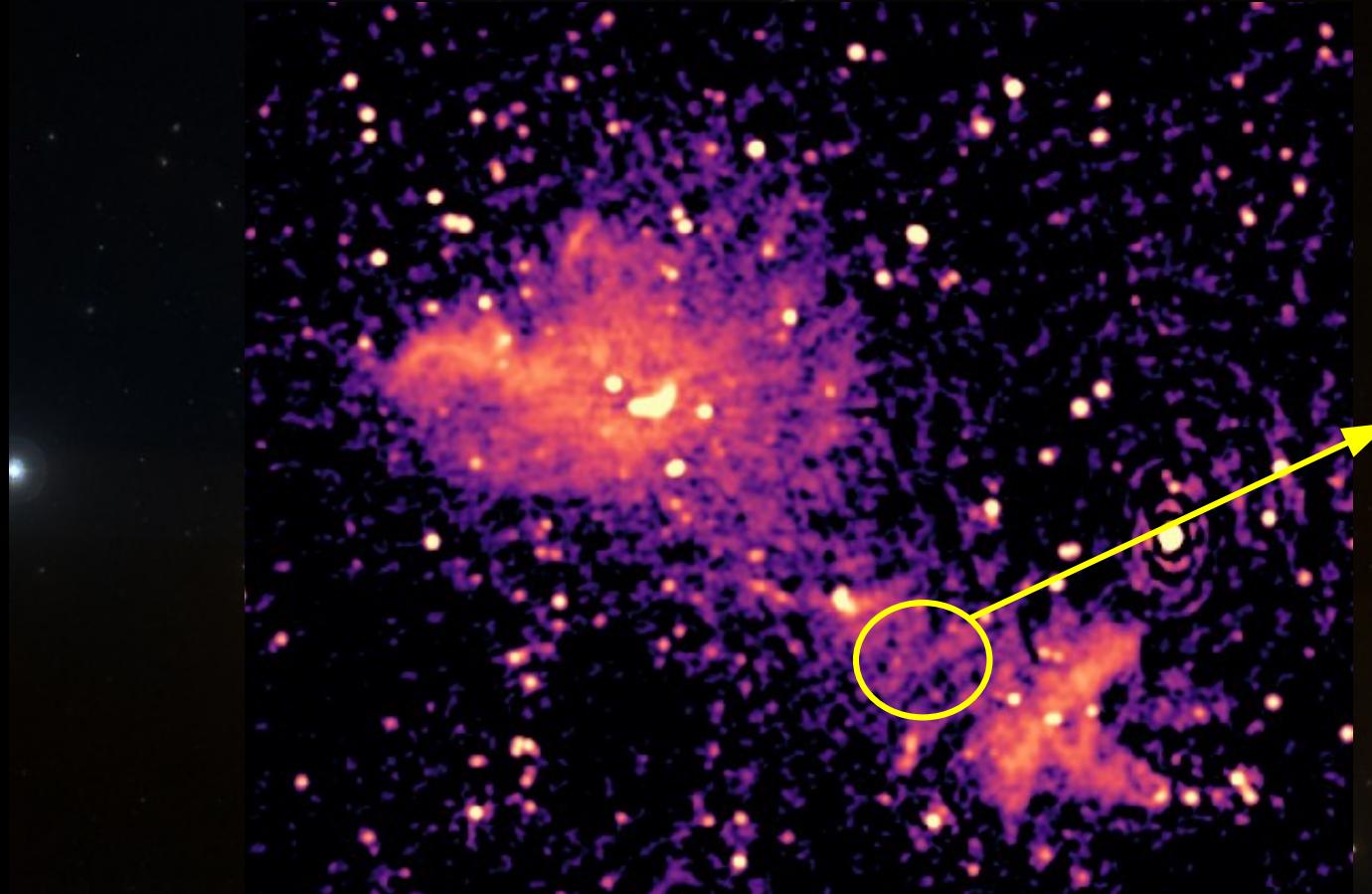
6 hours (out of 108)
beam: 60 arcsec
rms: 5 mJy/beam

Coma galaxy cluster

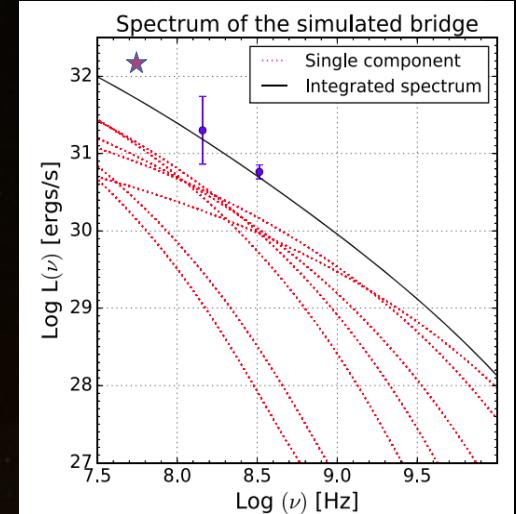


LOFAR **LBA** [preliminary]

Coma galaxy cluster

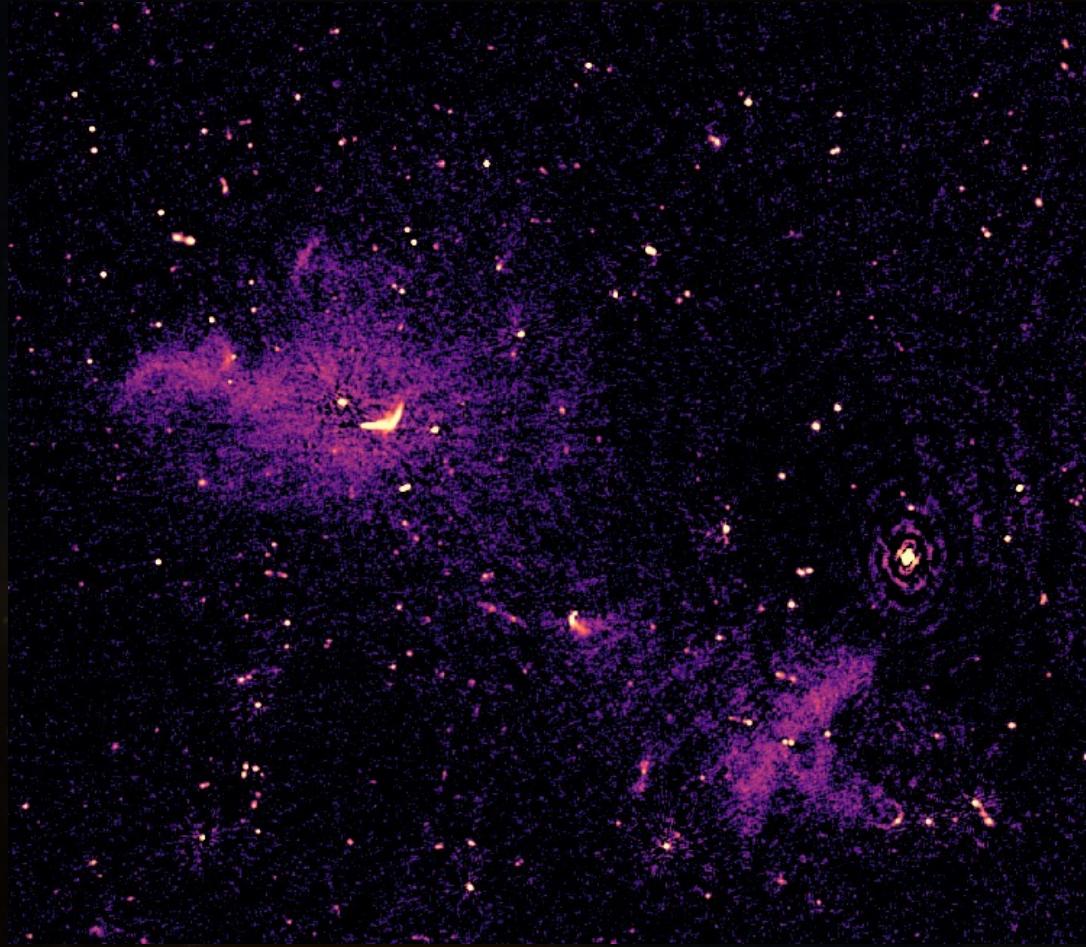


$\alpha_{54-144\text{MHz}} \sim -2.25$



LOFAR LBA [preliminary]

Coma galaxy cluster

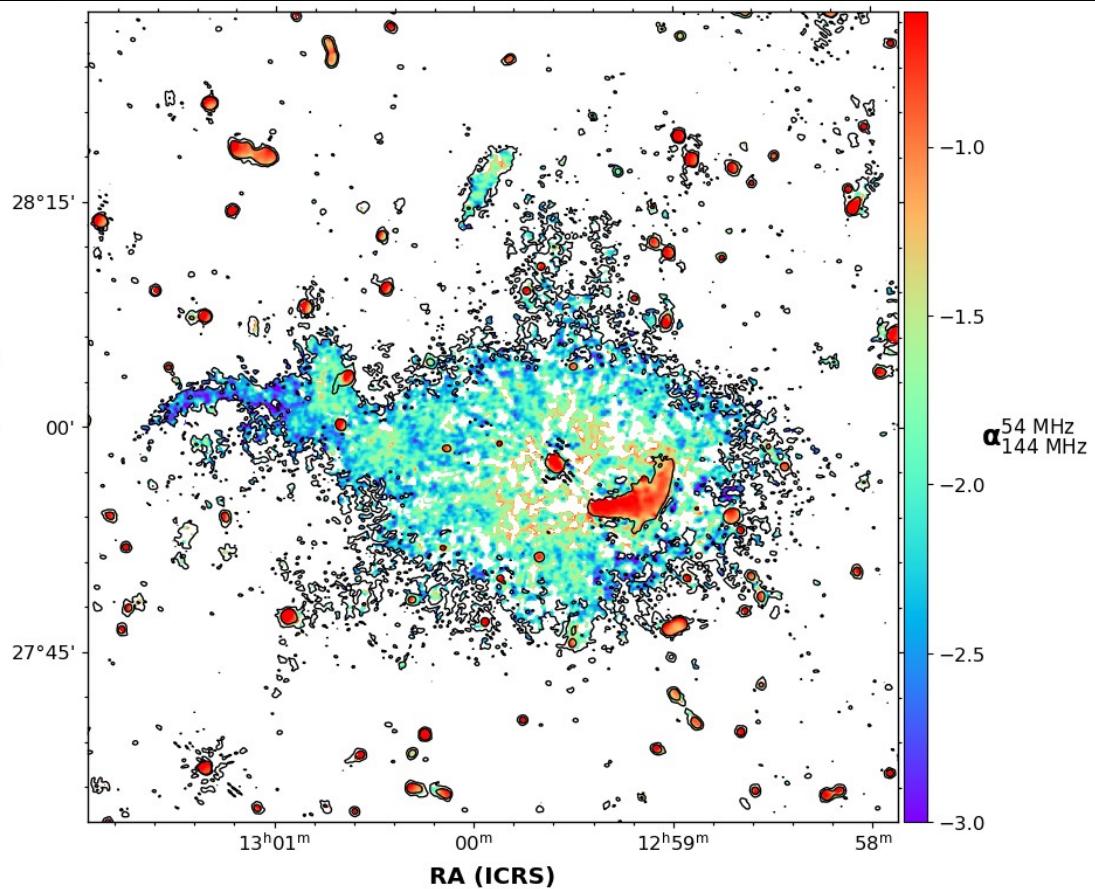


LOFAR **LBA** [preliminary]

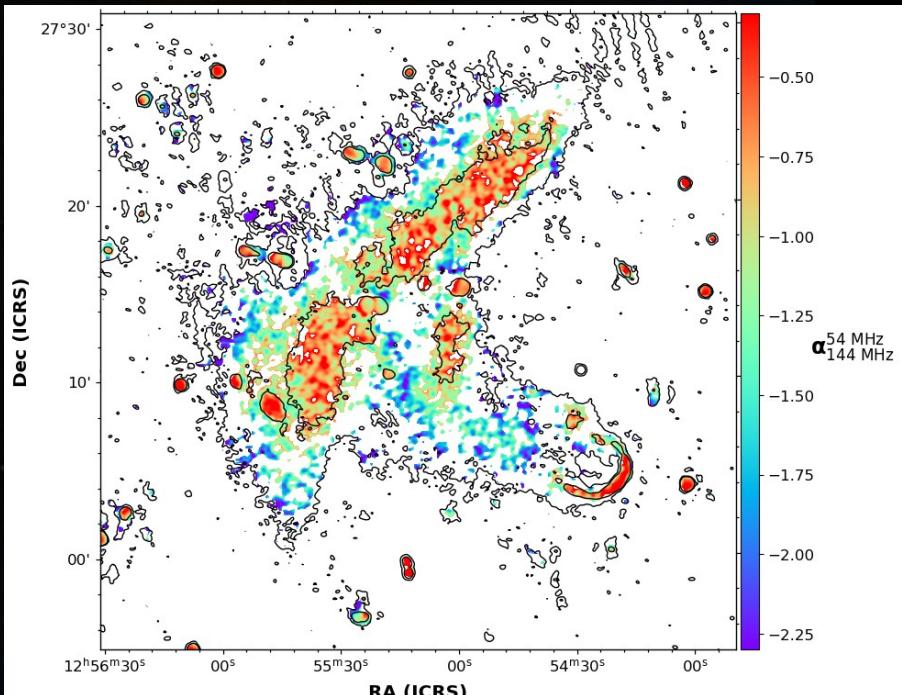
6 hours (out of 108)
beam: 20 arcsec
rms: 2 mJy/beam

Coma galaxy cluster

Dec (ICRS)

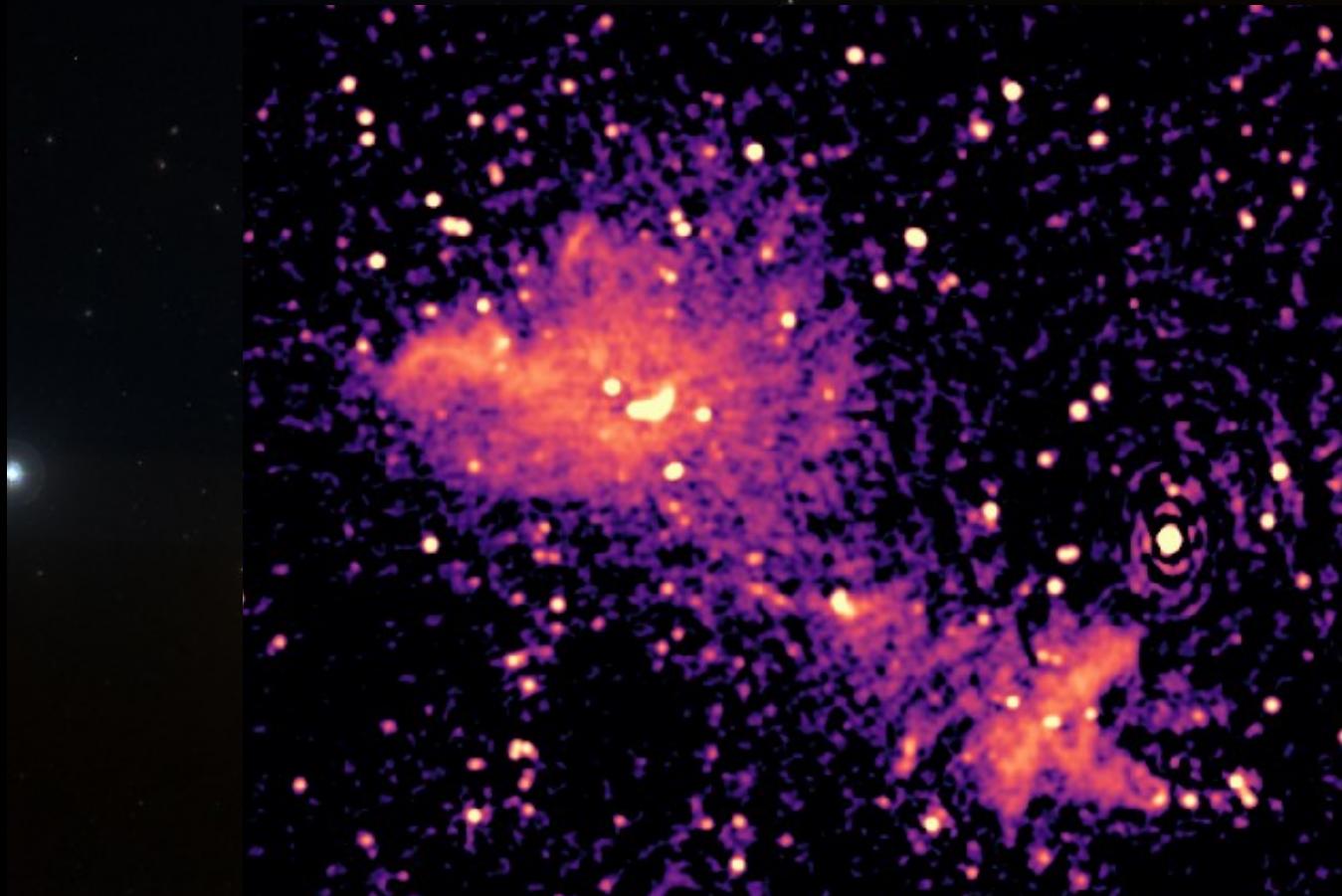


RA (ICRS)



LOFAR HBA+LBA [preliminary]

Coma galaxy cluster



To be continued...