

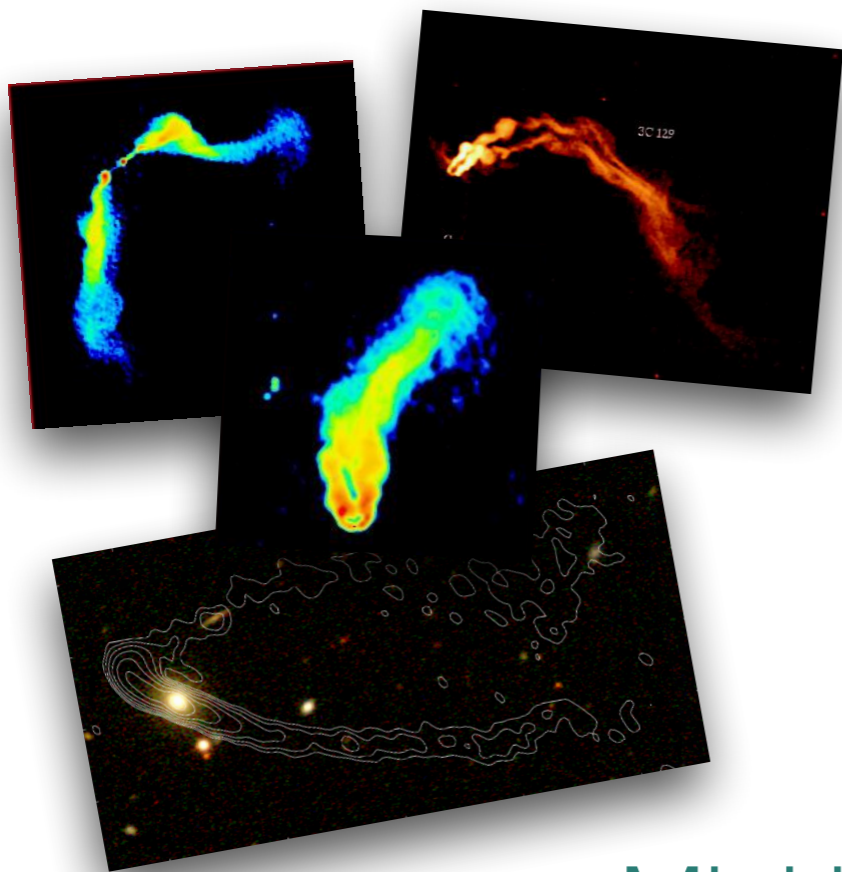
Ultra-low frequency follow-up of the galaxy cluster Zwcl 0634.1+4750

Virginia Cuciti
Hamburg Observatory
Ultra low frequency group

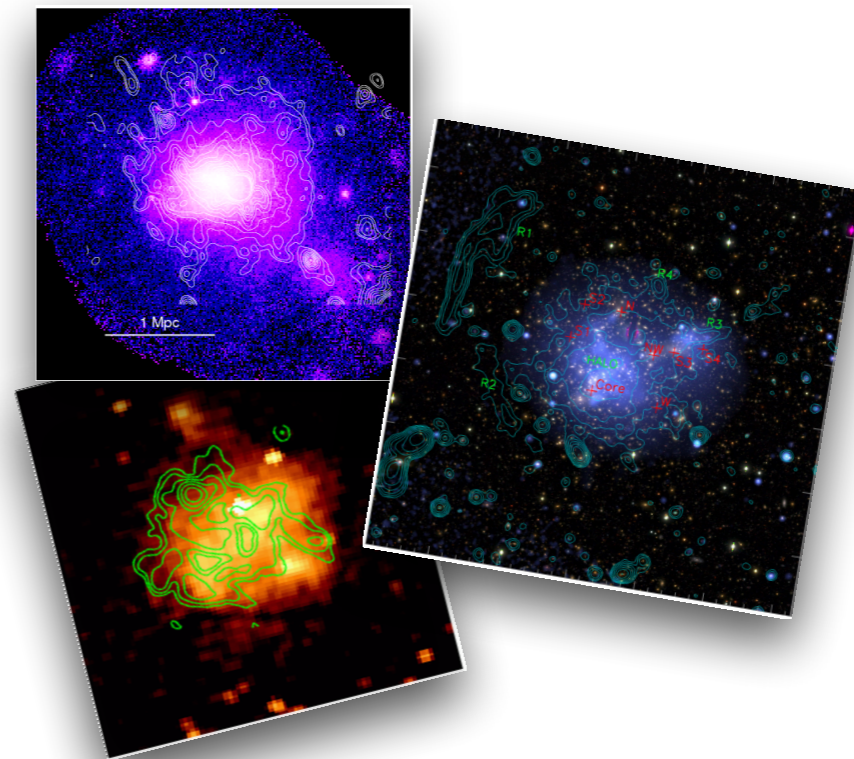
In collaboration with: F. De Gasperin, Marcus Brueggen, Alexander Jones, R. van Weeren, G. Brunetti, D. Dallacasa, R. Cassano....

Radio diffuse sources in galaxy clusters

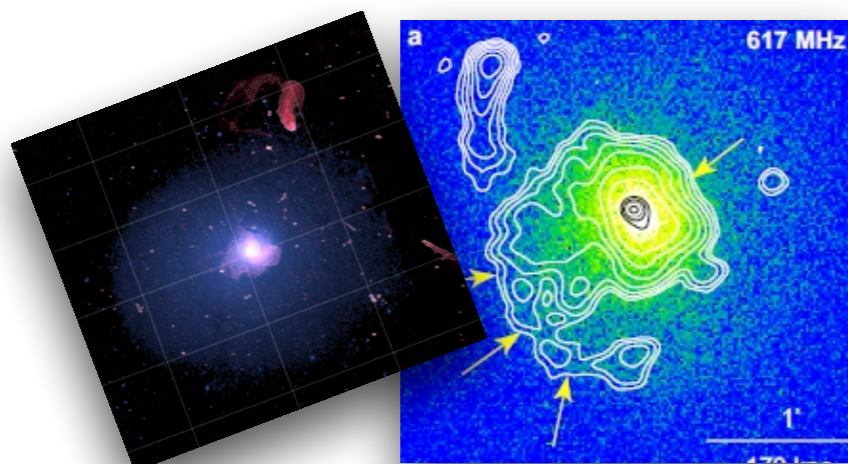
Radio galaxies



Radio halos

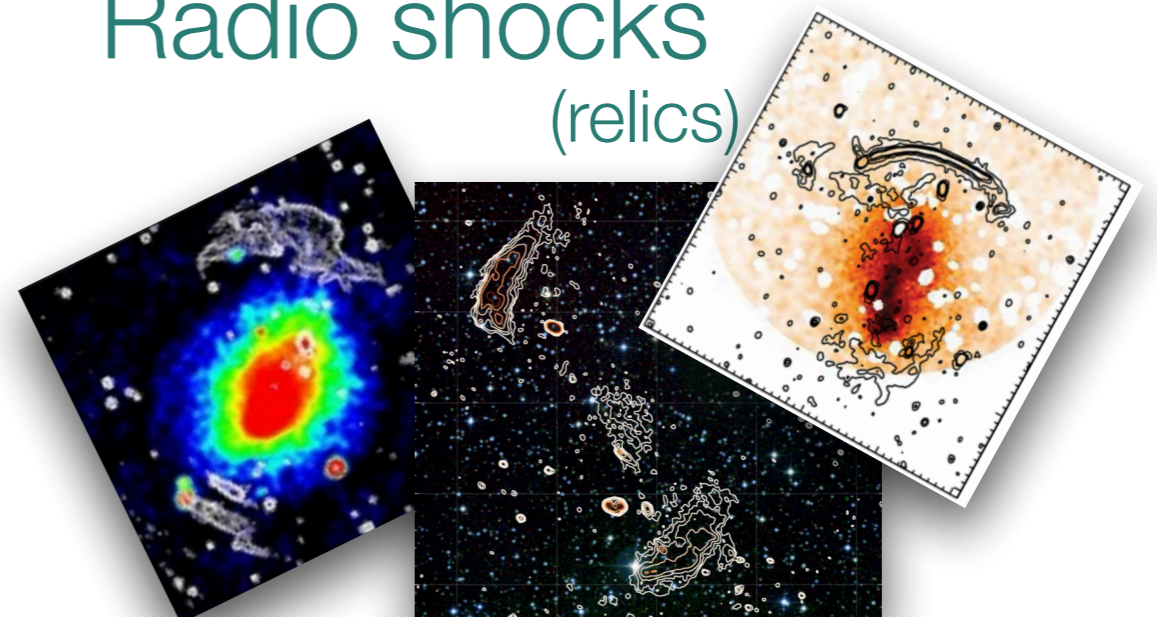


Mini halos



Radio shocks

(relics)

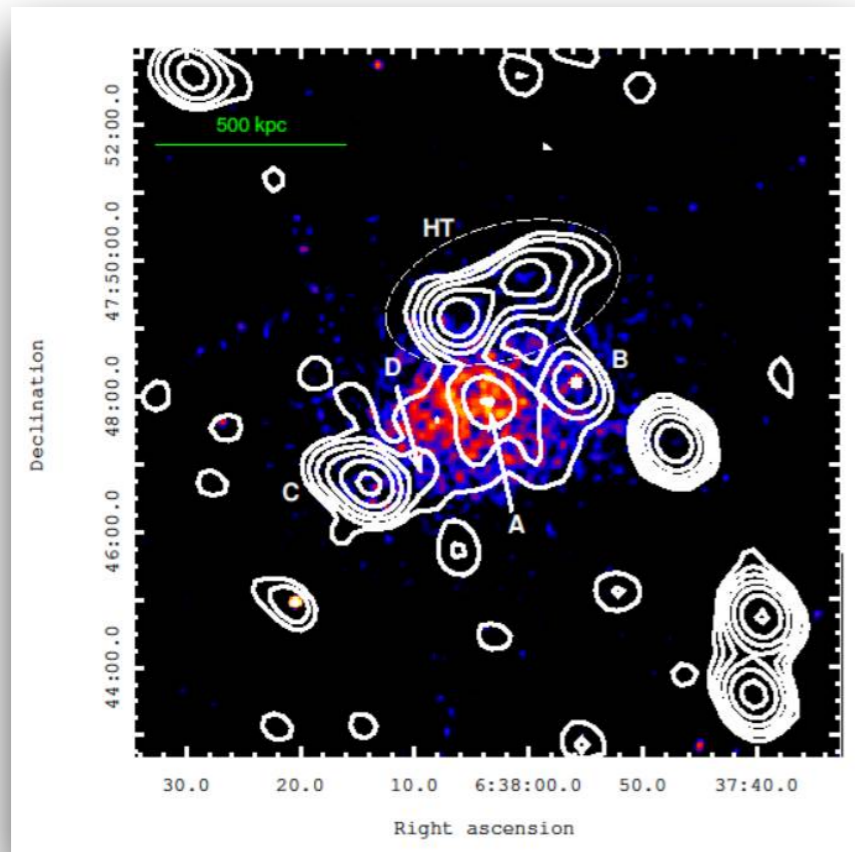
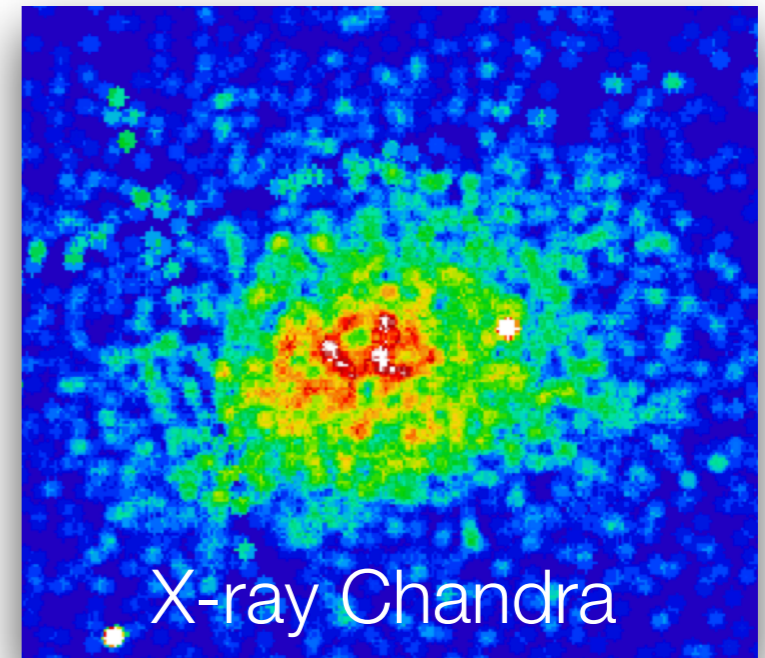


Zwcl 0634.1+4750

$M_{500} \sim 6.5 \times 10^{14} M_{\odot}$ (Planck Collaboration 2014)
 $z=0.17$

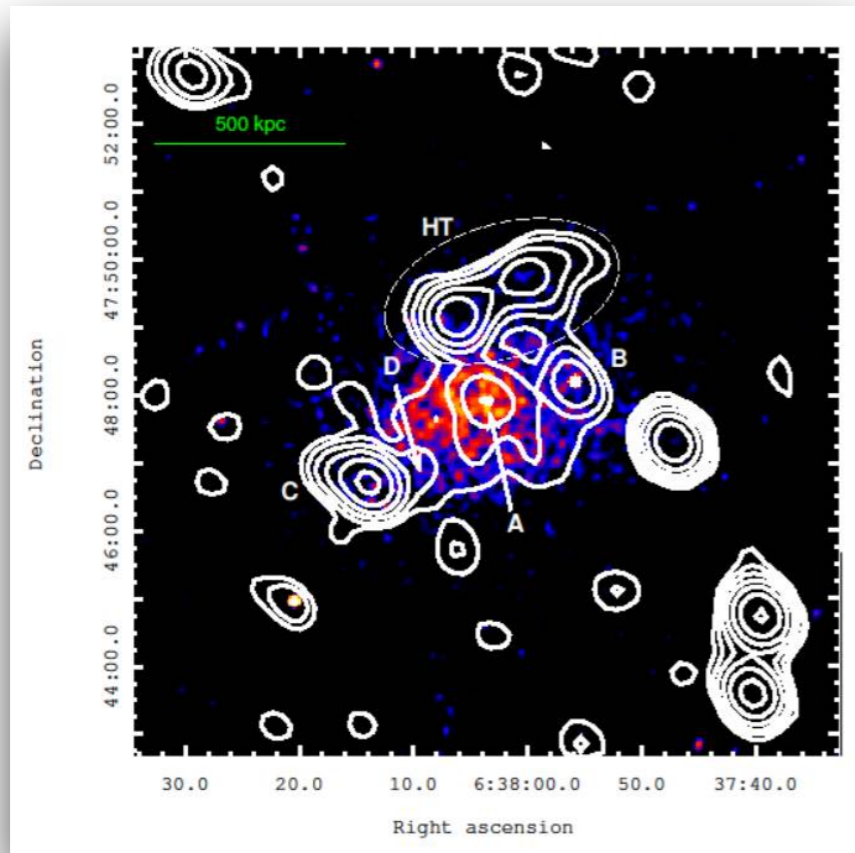
Available radio data:

- JVLA (B+D array) 1.5 GHz (Cuciti et al., 2018)
- GMRT 330 MHz (Cuciti et al., 2018)
- LOFAR LBA

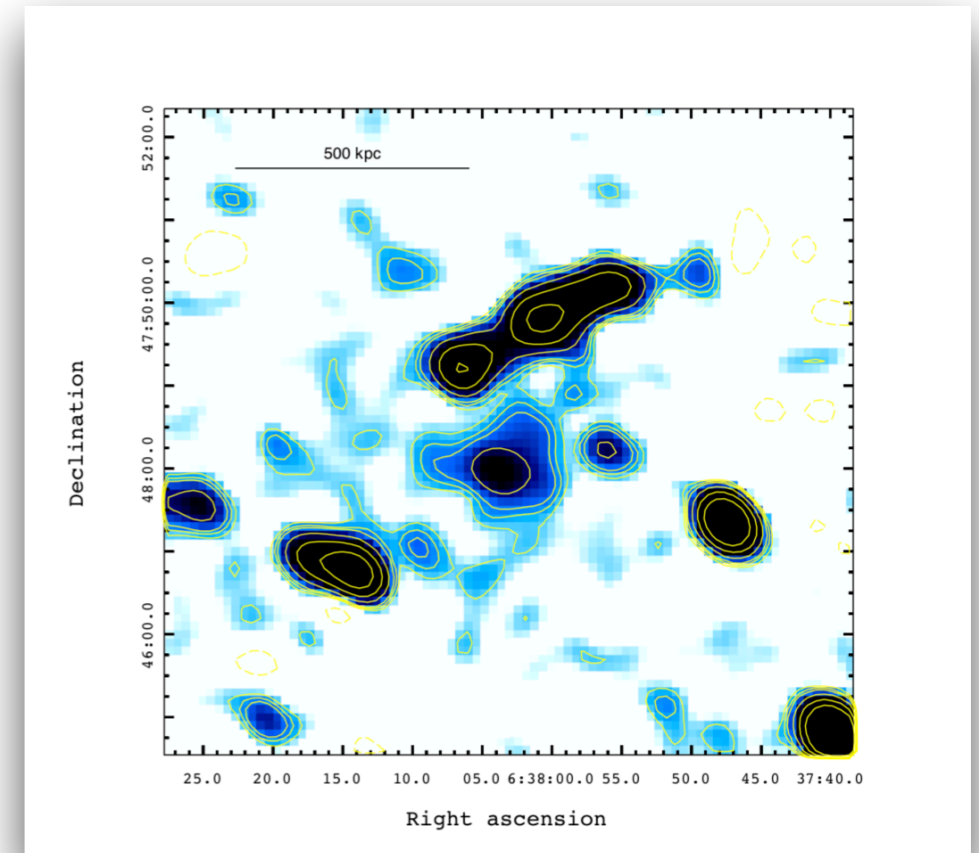


Radio halo
+
Interesting head-tail
radio galaxy

Zwcl 0634.1+4750 Radio halo



rms \approx 45 μ Jy/b beam \approx 36" \times 30"



rms \approx 0.25 mJy/b beam \approx 30.5" \times 23"

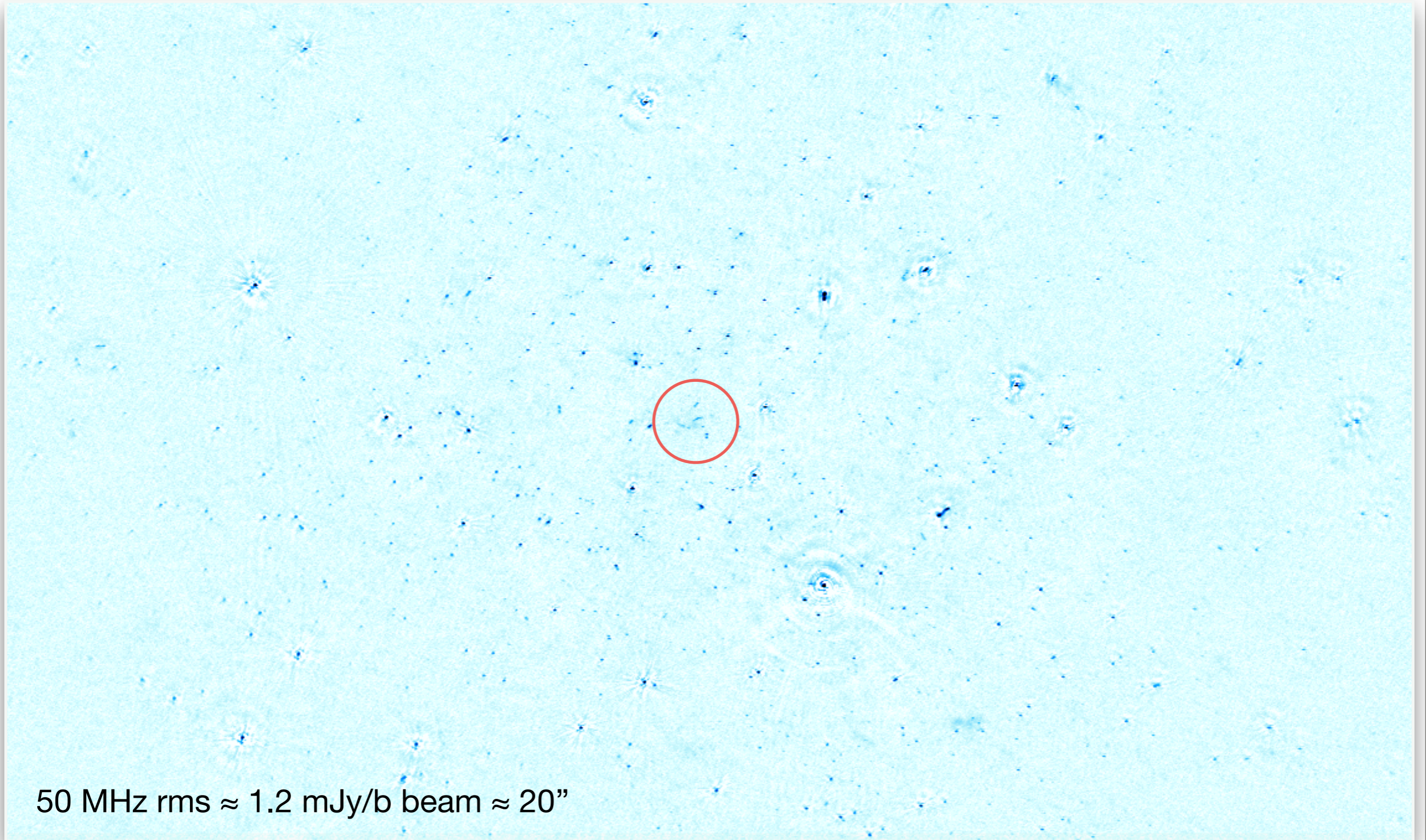
$$S_{330\text{MHz}} = 20.3 \pm 2.7 \text{ mJy}$$

$$S_{1.5\text{GHz}} = 3.3 \pm 0.2 \text{ mJy}$$

$$R_H \approx 300 \text{ kpc}$$

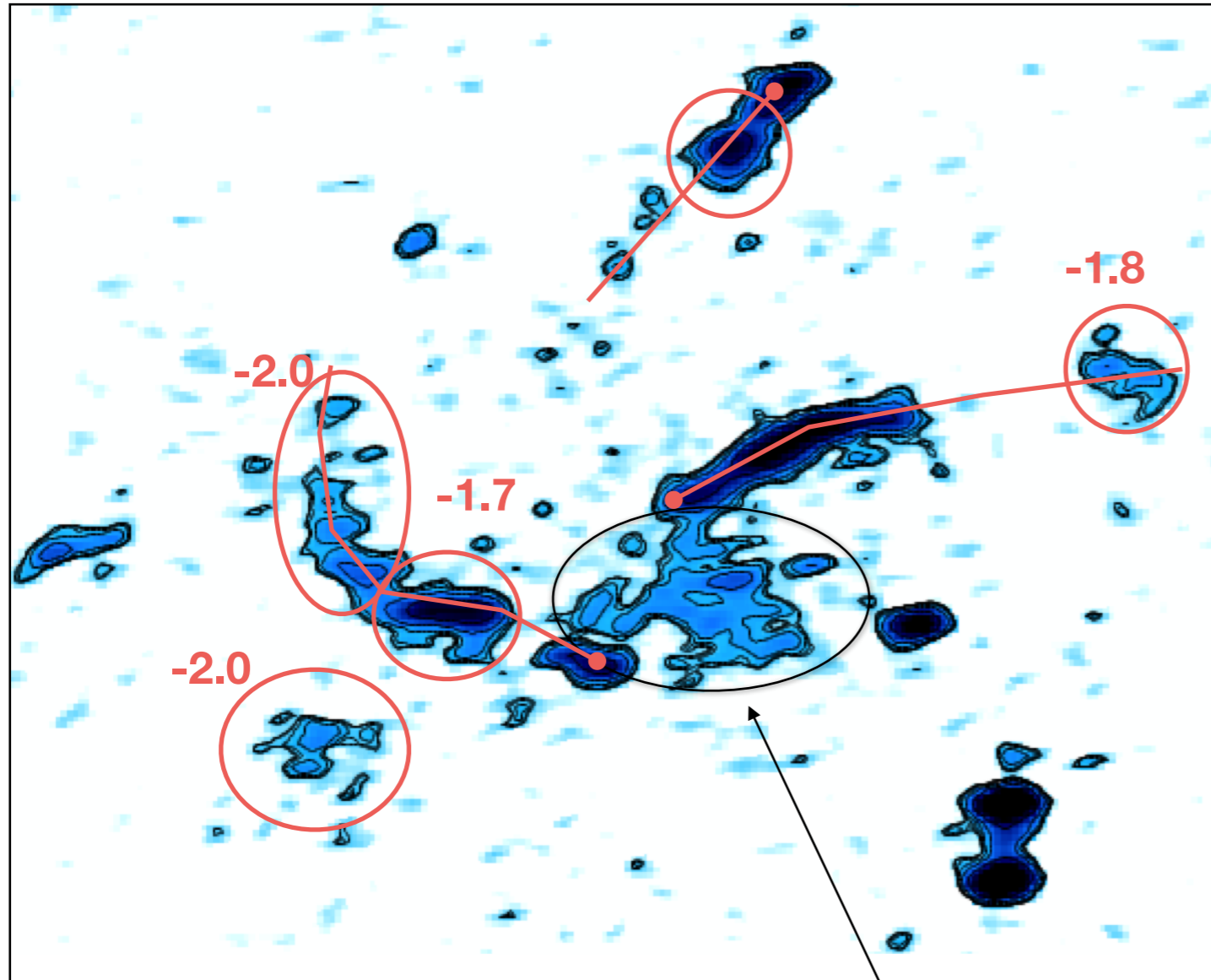
$$\alpha \approx -1.1$$

Zwcl 0634.1+4750 LOFAR LBA



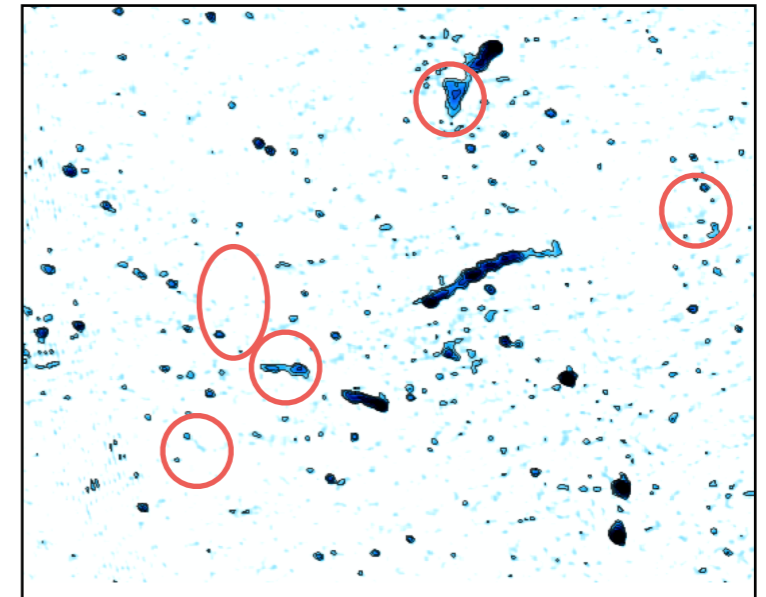
50 MHz rms \approx 1.2 mJy/b beam \approx 20''

LOFAR LBA 50 MHz

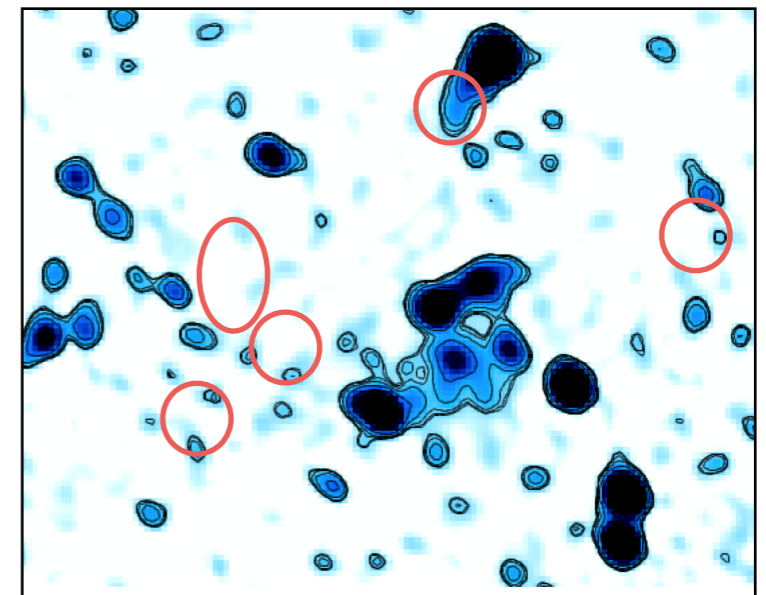


Radio halo

GMRT 330 MHz

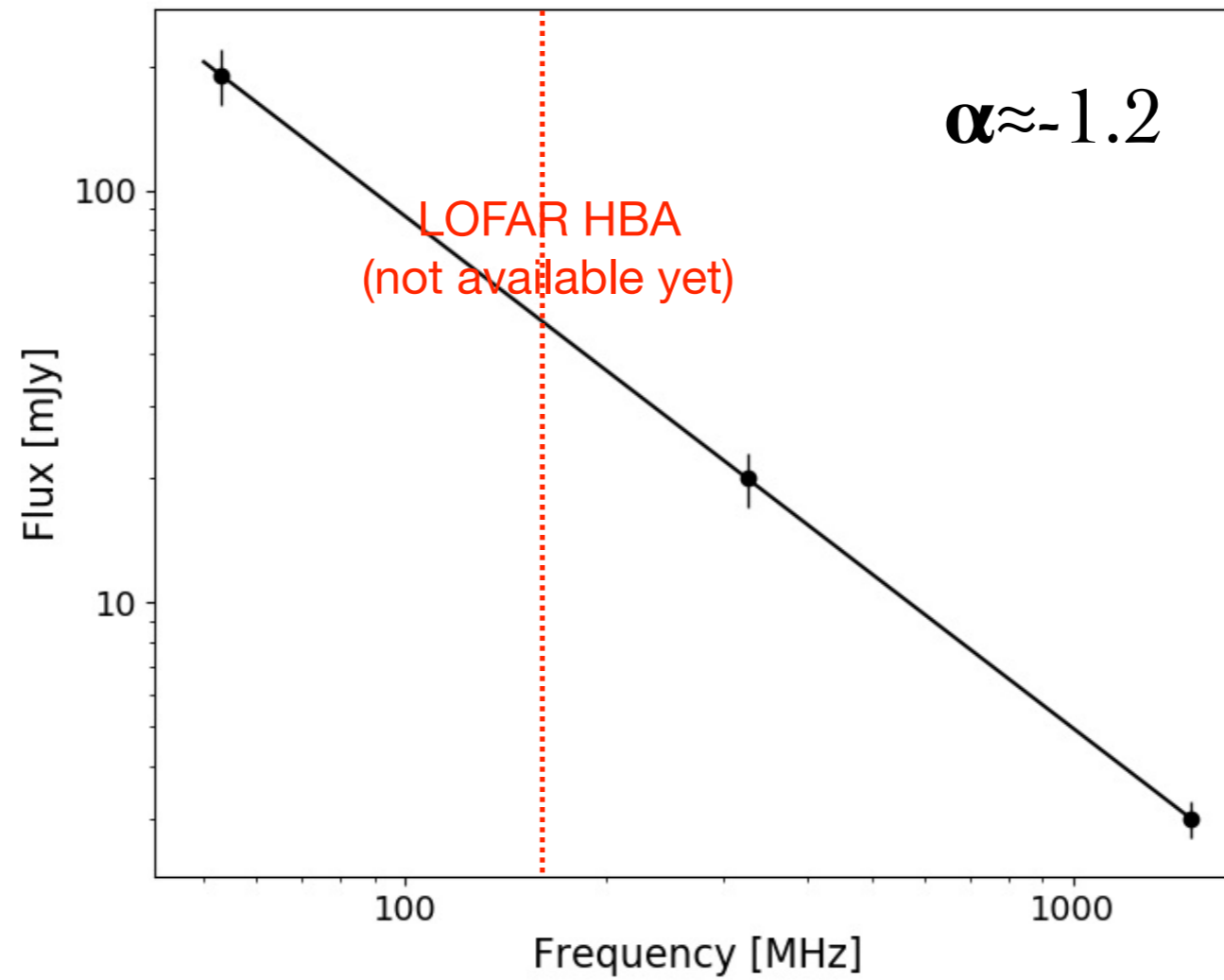


JVLA 1500 MHz

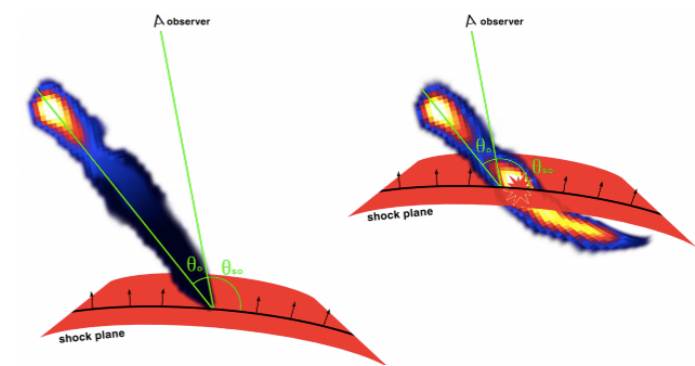
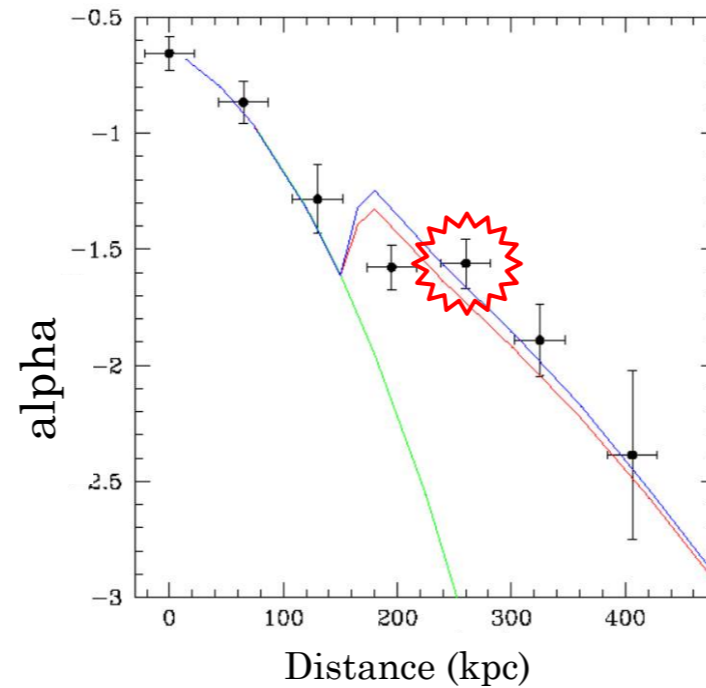
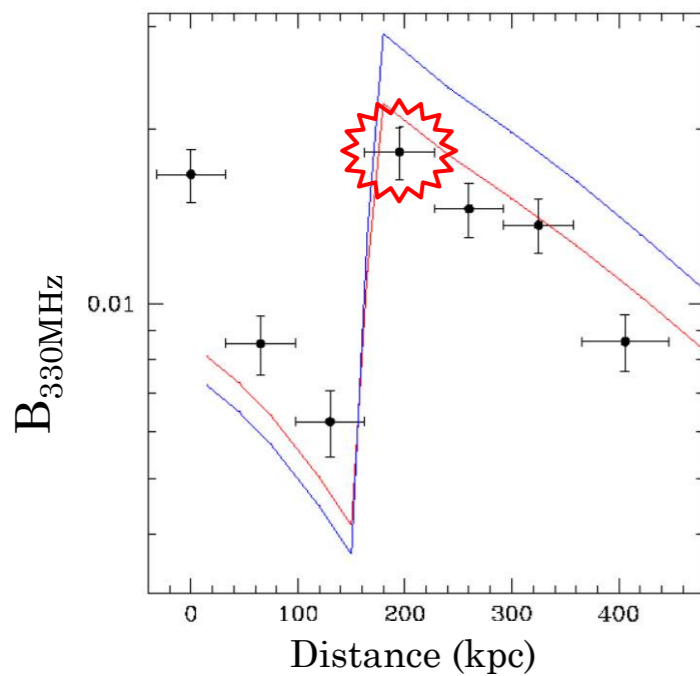
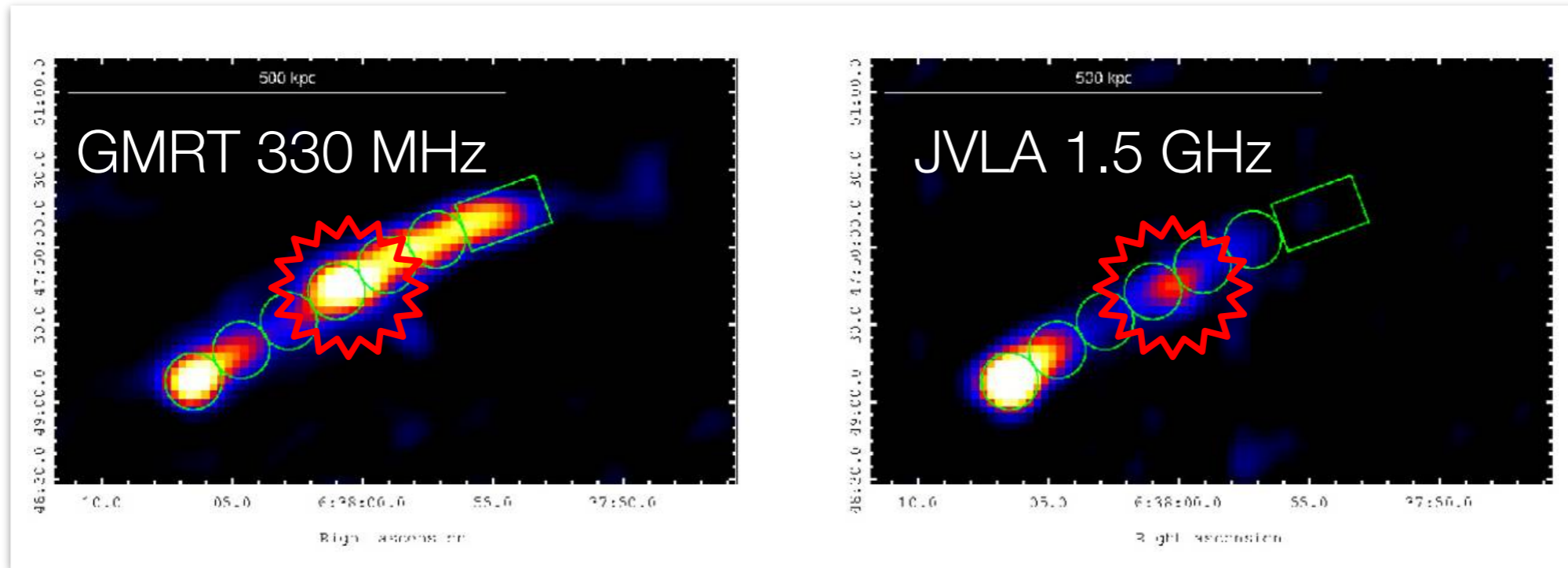


Radio halo spectrum

Preliminary



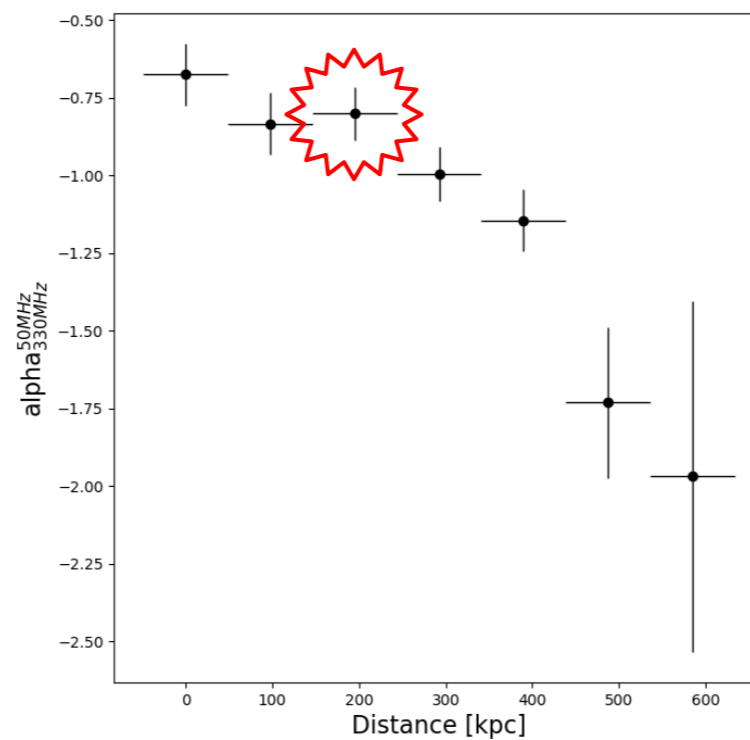
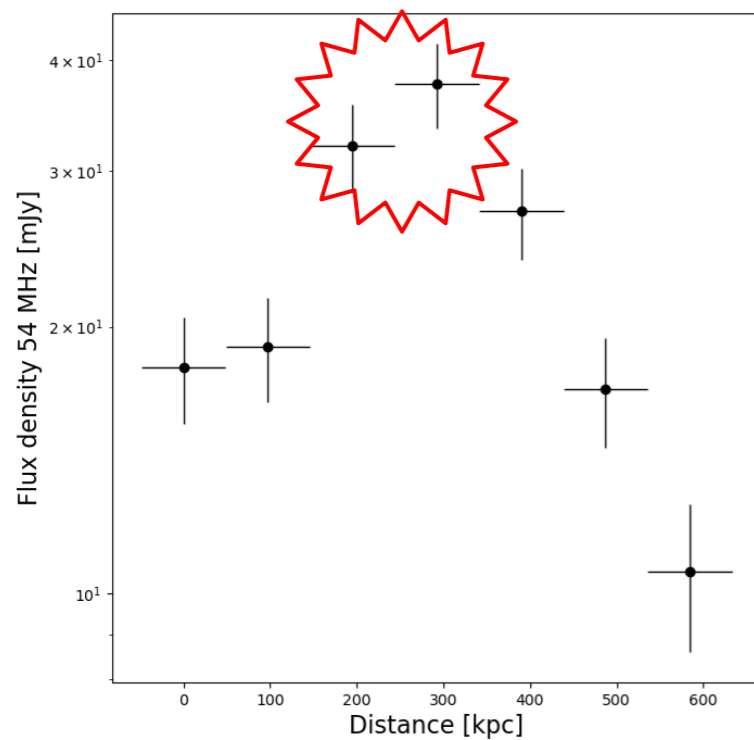
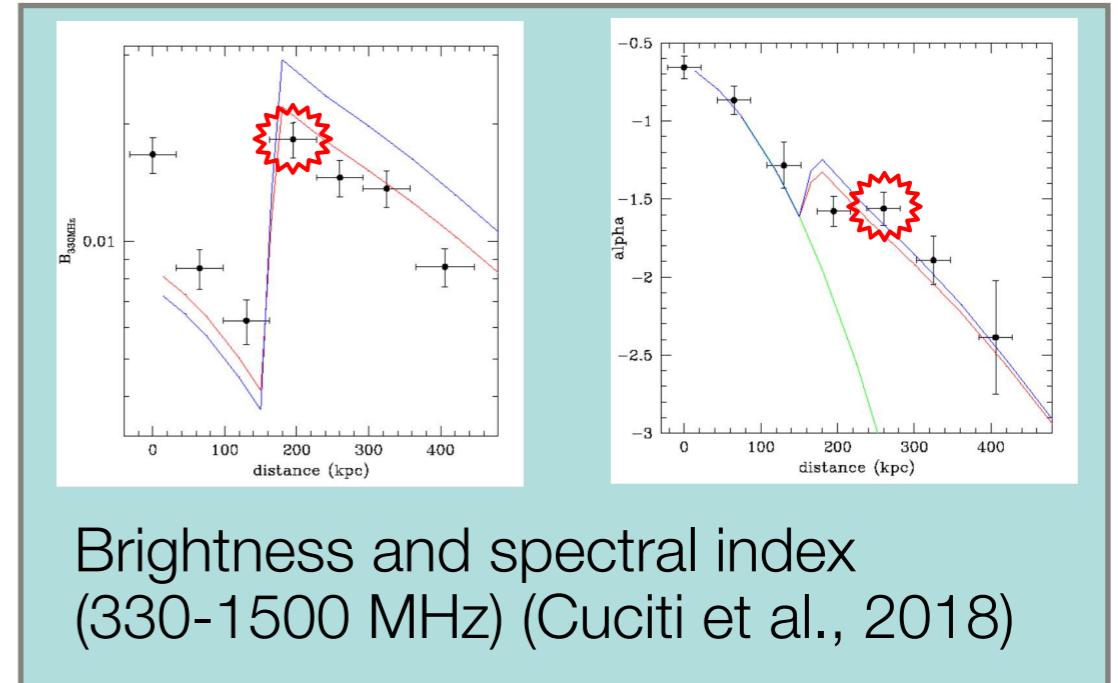
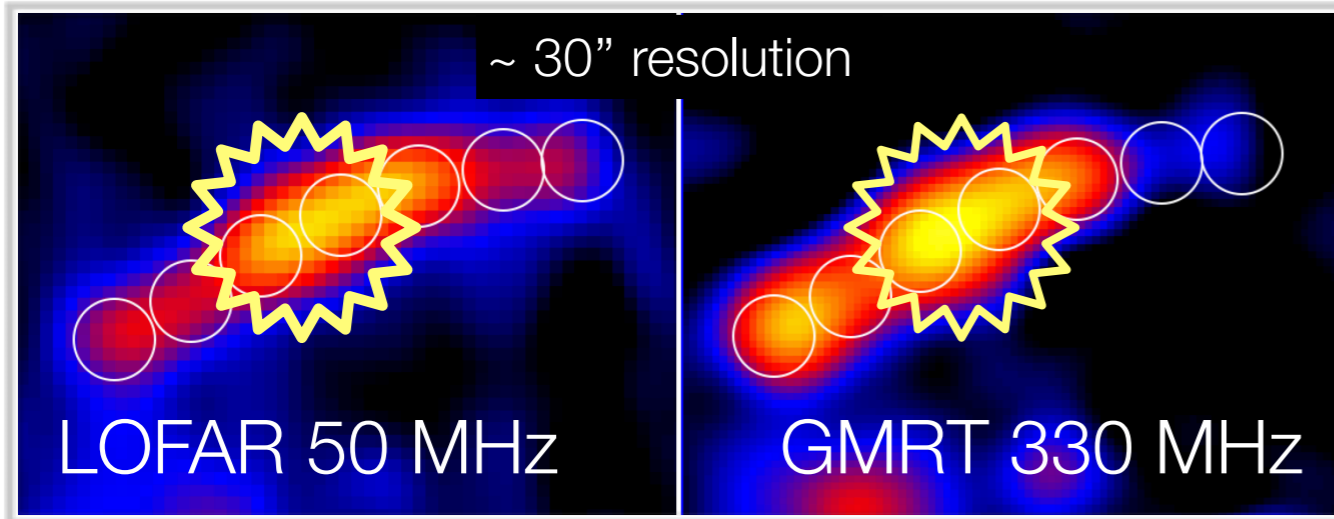
Zwcl 0634.1+4750 Head tail



Re-energized plasma
from a shock???

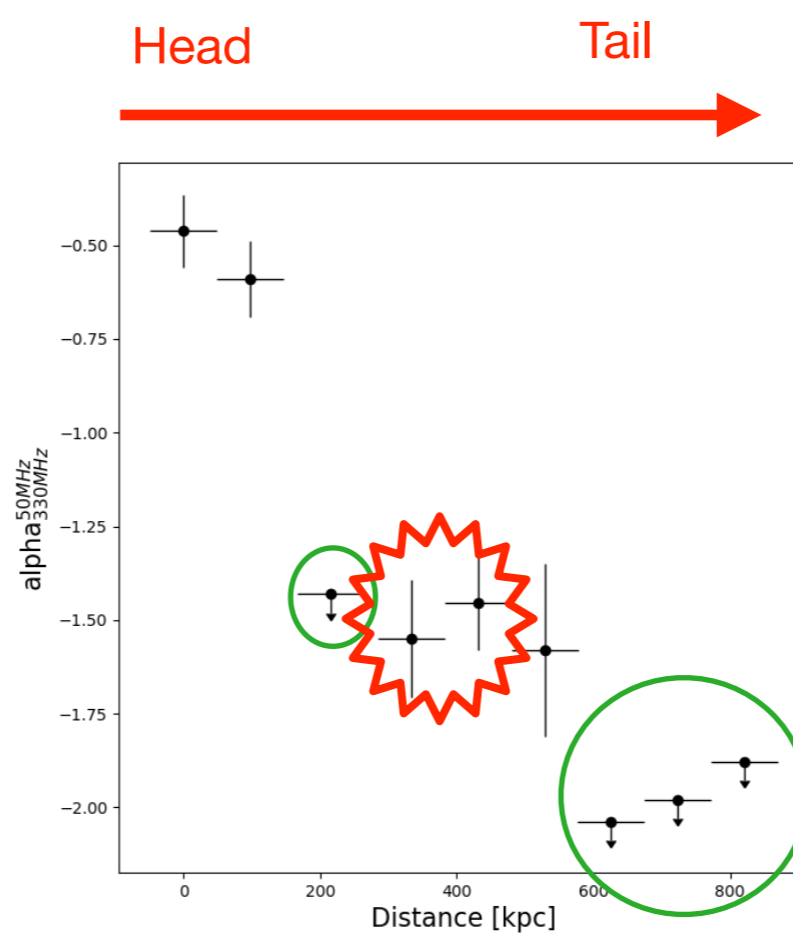
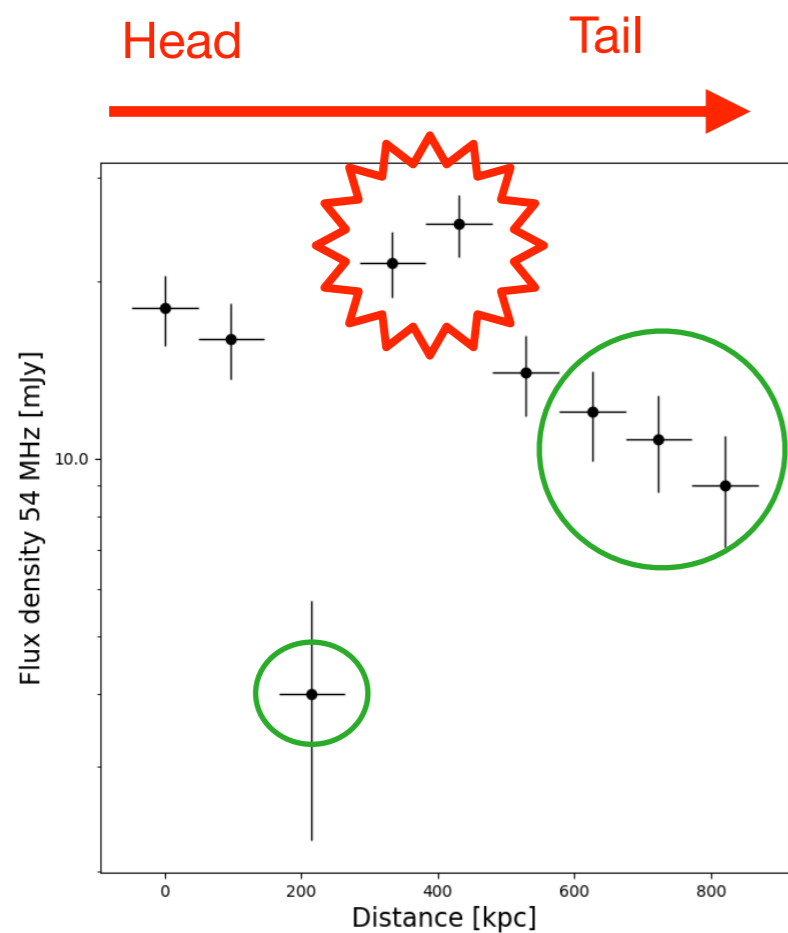
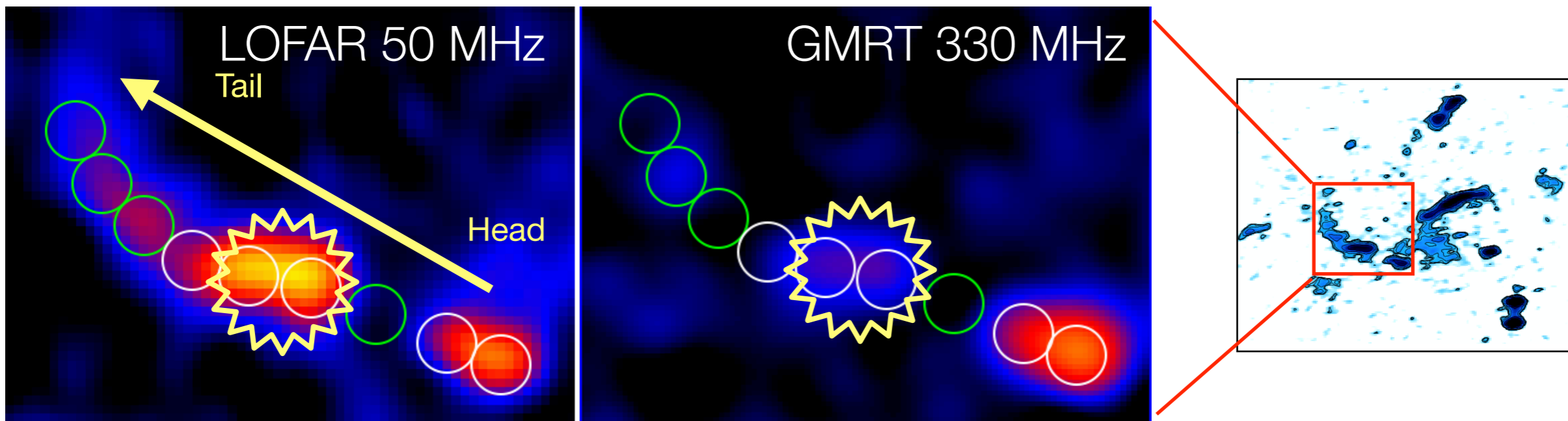
*e.g. Pfrommer & Jones (2011),
De Gasperin et al. (2017)*

Head tail north



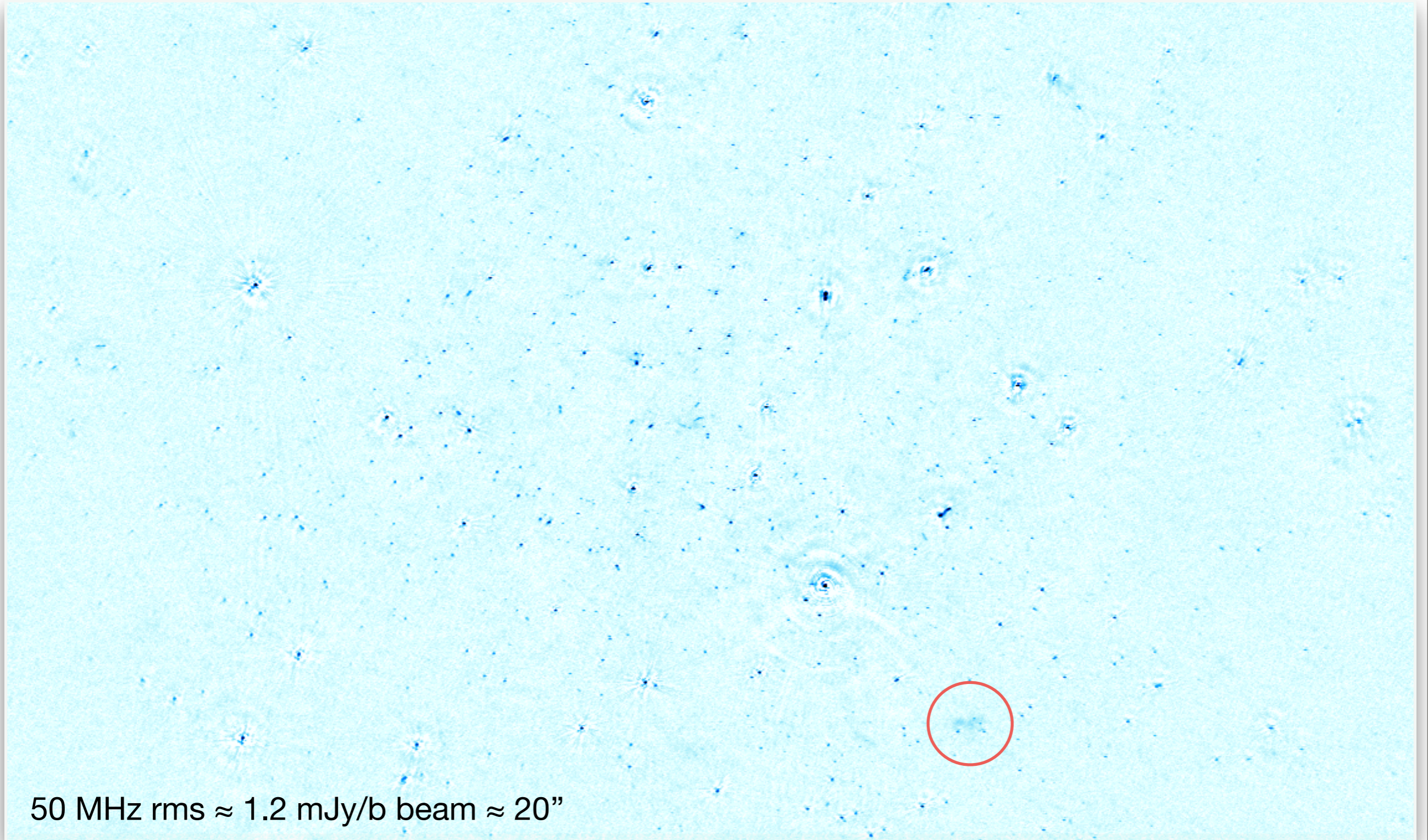
~200 kpc from the tail
re-energization takes
place

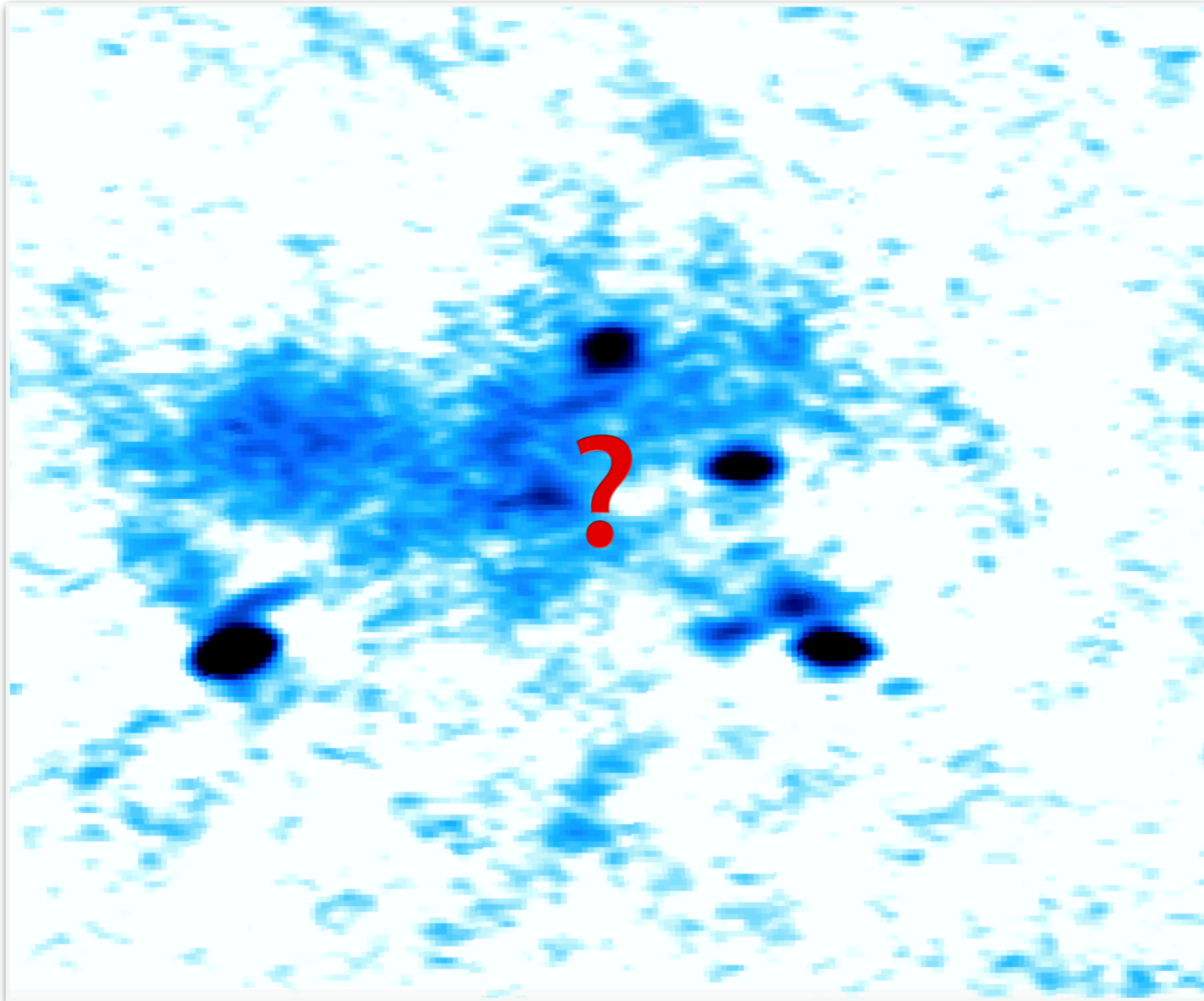
Head tail East



Plasma re-energization in head tail radio galaxies (e.g. Pfrommer & Jones 2011, Shimwell et al., 2016, de Gasperin et al., 2017, Cuciti et al., 2018) ...more common with low frequency observations

Serendipitous discovery

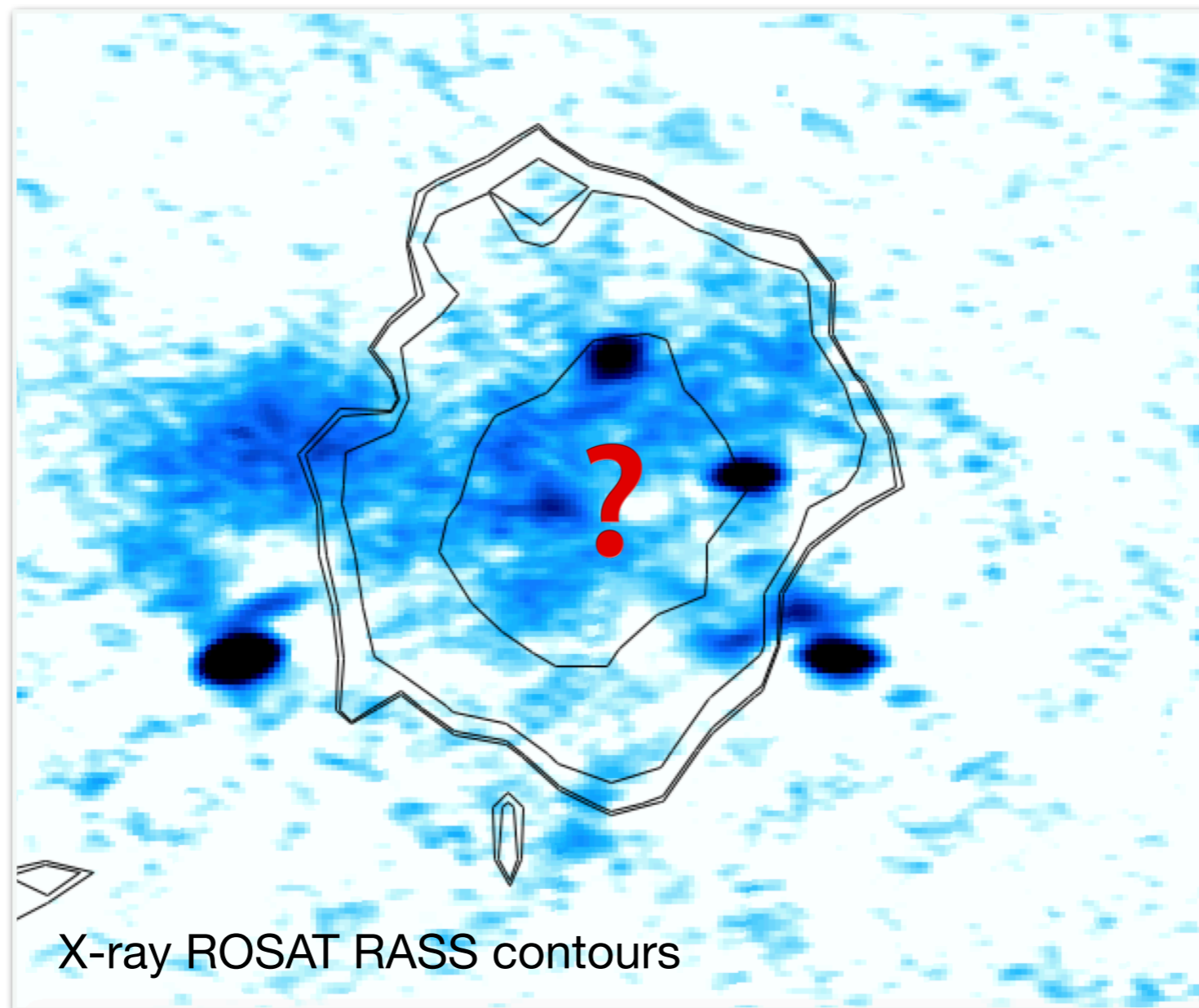




Galaxy cluster RXCJ 0629.1+460

$z=0.13$, $L_{500}=1.34 \times 10^{37} W$, $M_{500} \approx 2.3 \times 10^{14} M_{\odot}$ (Piffaretti et al., 2011)

Preliminary



Summary

Zwcl 0634.1+4750 LOFAR LBA observation:

- Radio halo
- Head tail radio galaxies — — — — —> re-energization?
- Small cluster in the field — — — — —> diffuse emission?

Future work:

- HBA observation
- Spectral index map



Head tail East 330 MHz flux

