

Magnetic Fields and Massive Satellites

Ram Pressure Stripping in the CGM

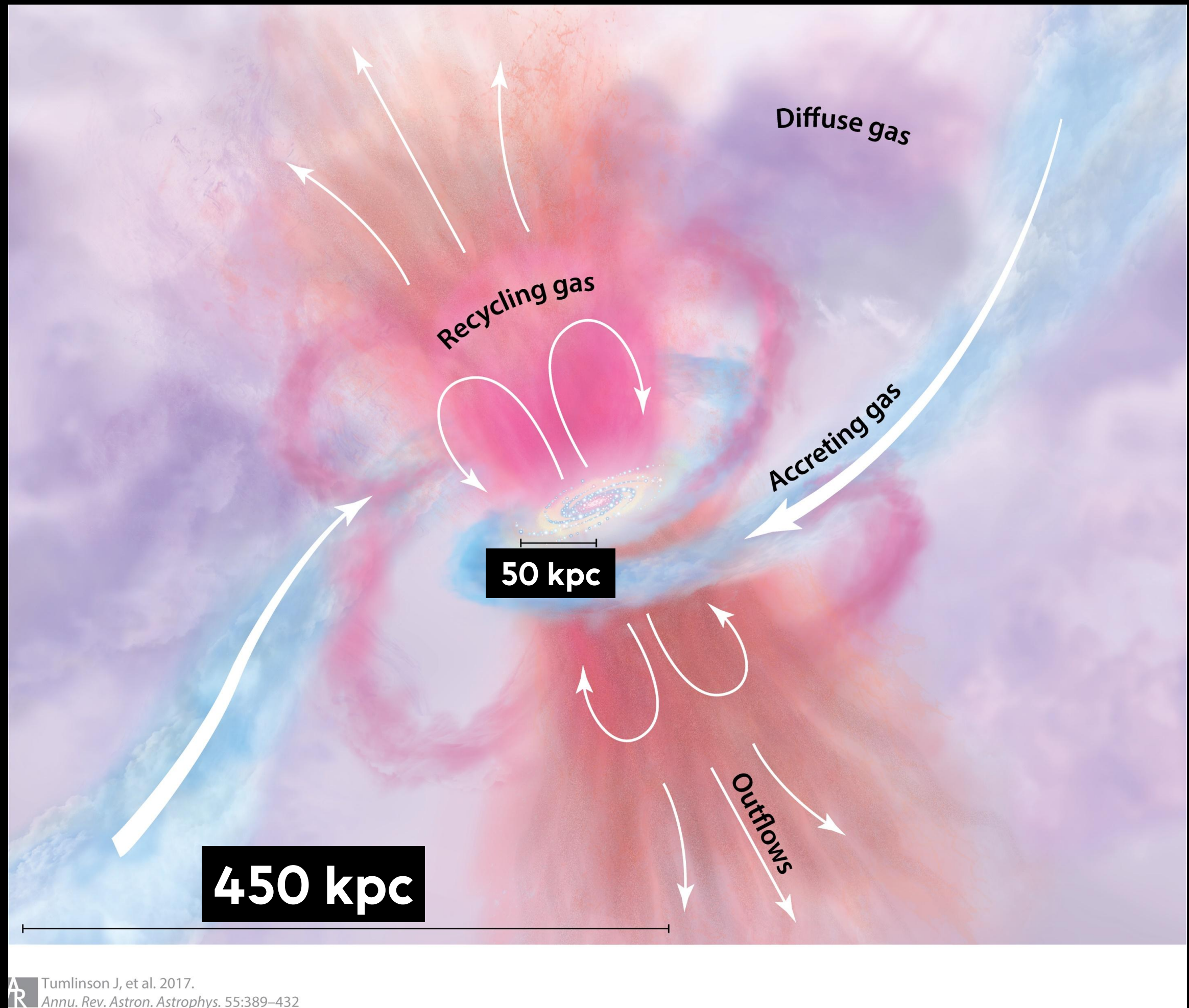
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Rebekka Bieri, Maria Werhahn & Rosie Talbot*

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National Astronomy Meeting 2025 - Durham

What is the Circumgalactic Medium?





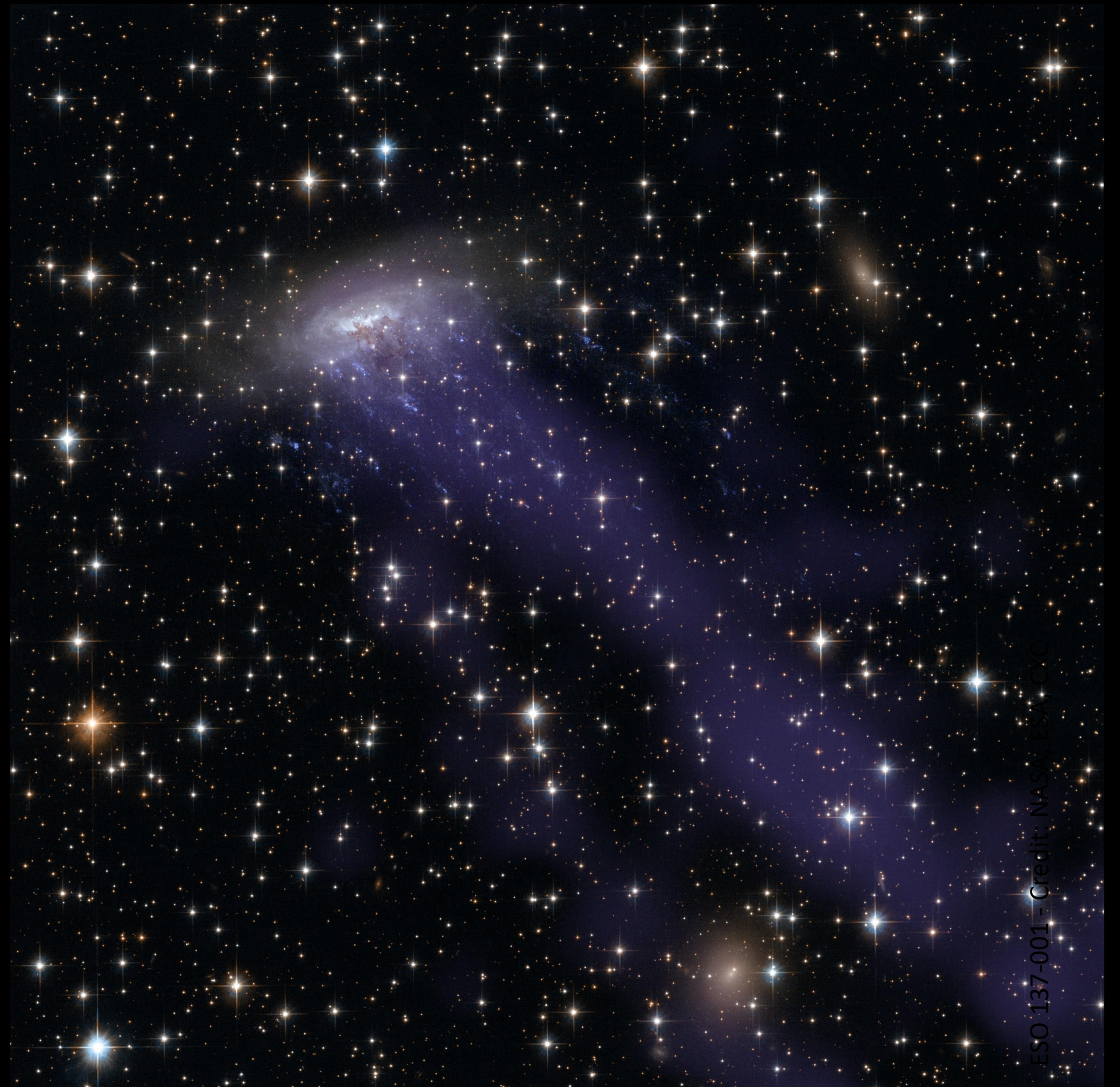
DESI Legacy Imaging Surveys/LBNL/DOE & KPNO/CTIO/NOIRLab/NSF/AURA

Ram Pressure Stripping

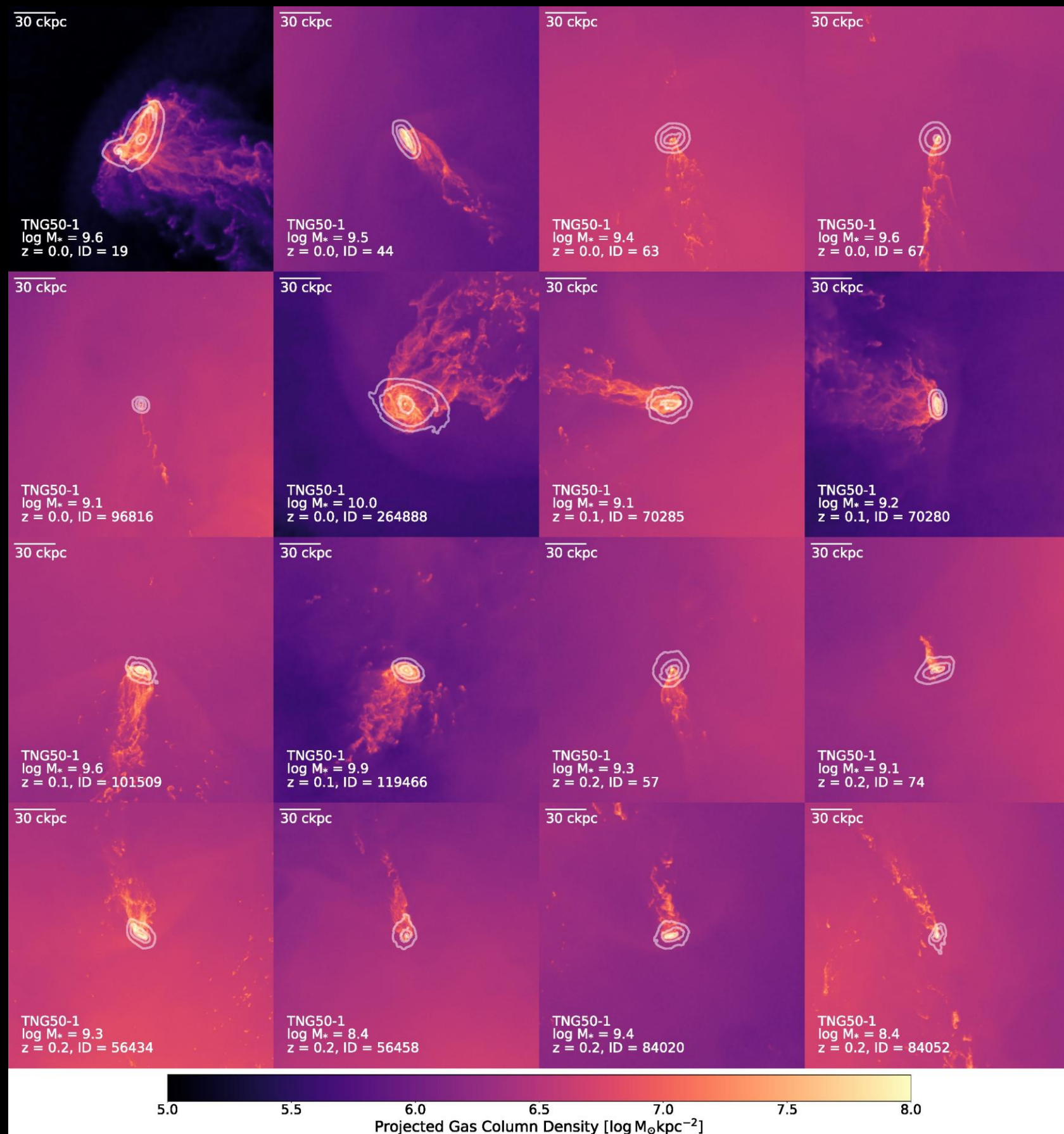
Proportional to density and the relative velocity squared

$$P_{\text{ram}} > 2\pi G \Sigma_* \Sigma_{\text{gas}}$$

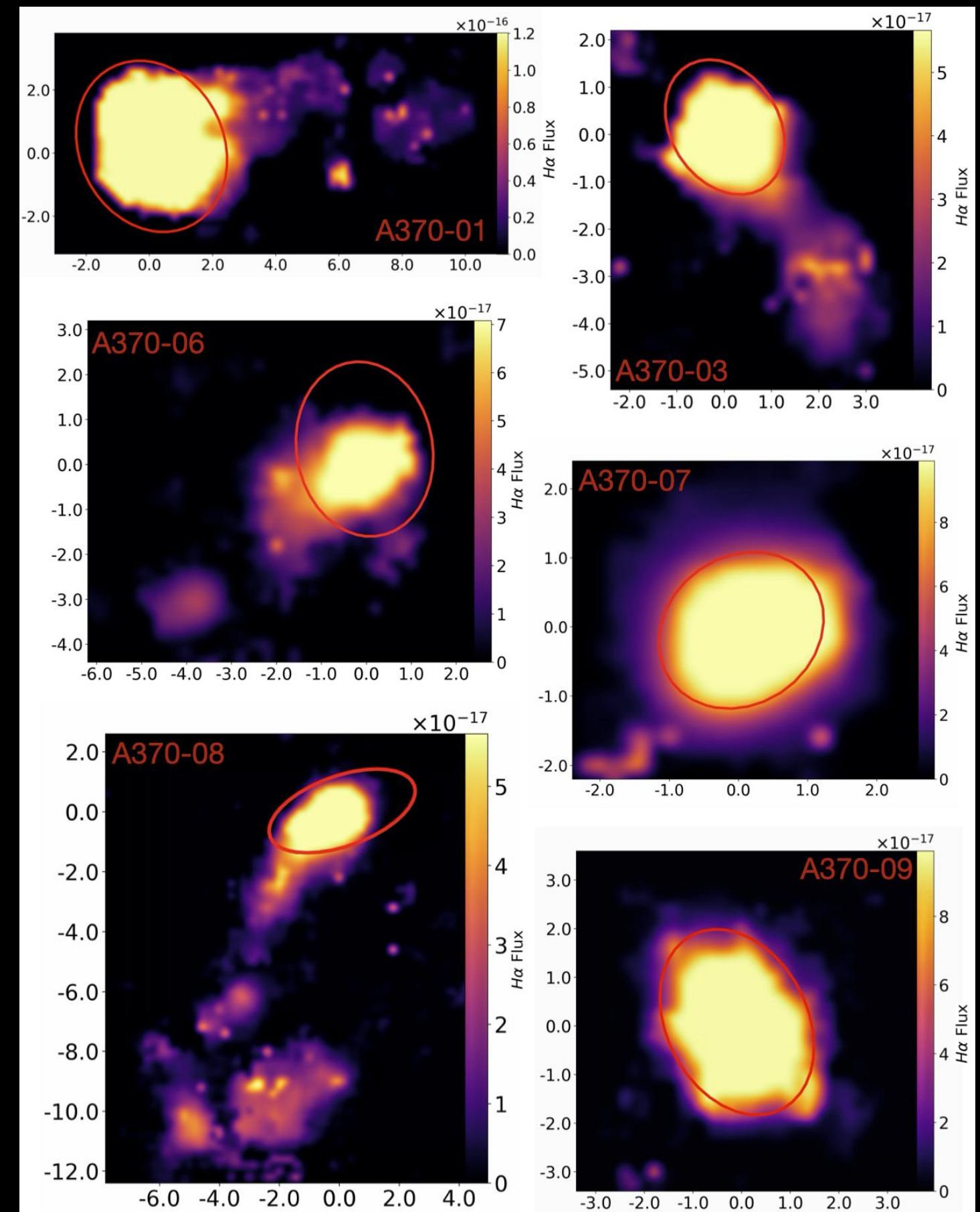
Stripping criterion - Ram Pressure must exceed the gravitational restoring force (Gunn & Gott 1972)



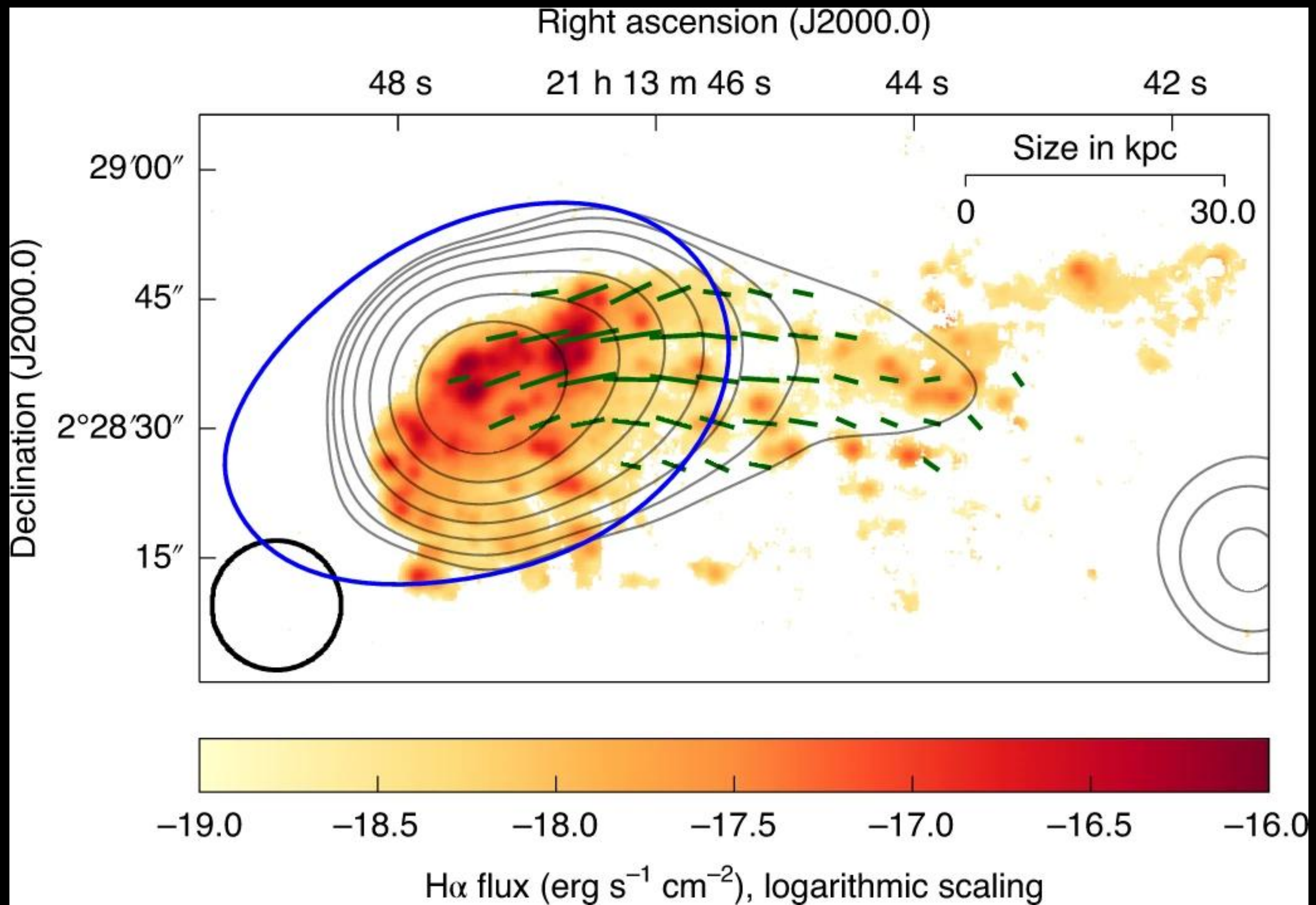
ESO 137-001 - Credit: NASA, ESA, CXC



Credit: Göller et al. (2023)



Credit: Khoram et al. (2024)



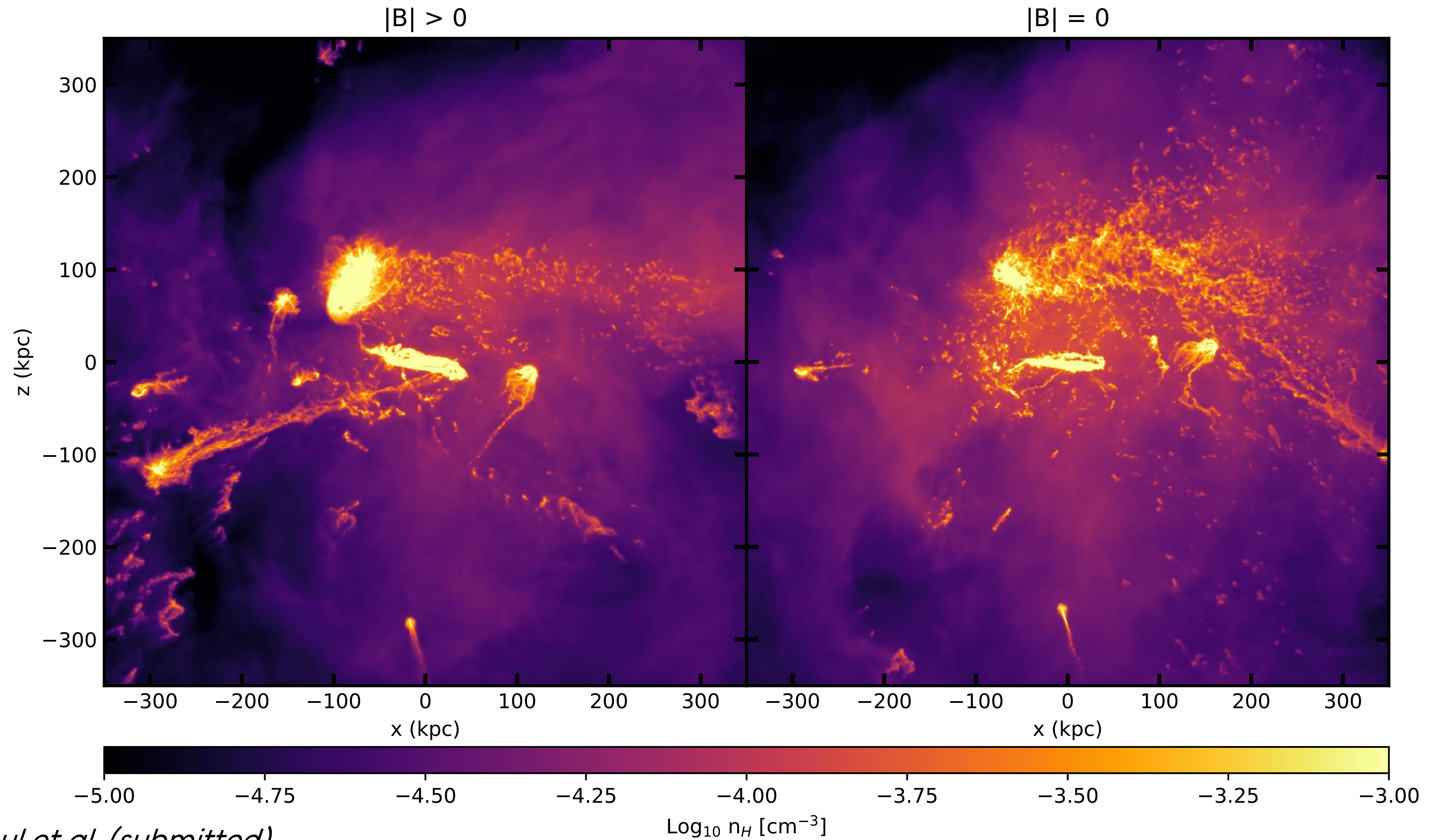
Müller et al. (2021)

How do magnetic fields affect Ram Pressure Stripping of satellite galaxies in the CGM?

200 kpc

$z = 10.0$





Rintoul et al. (submitted)

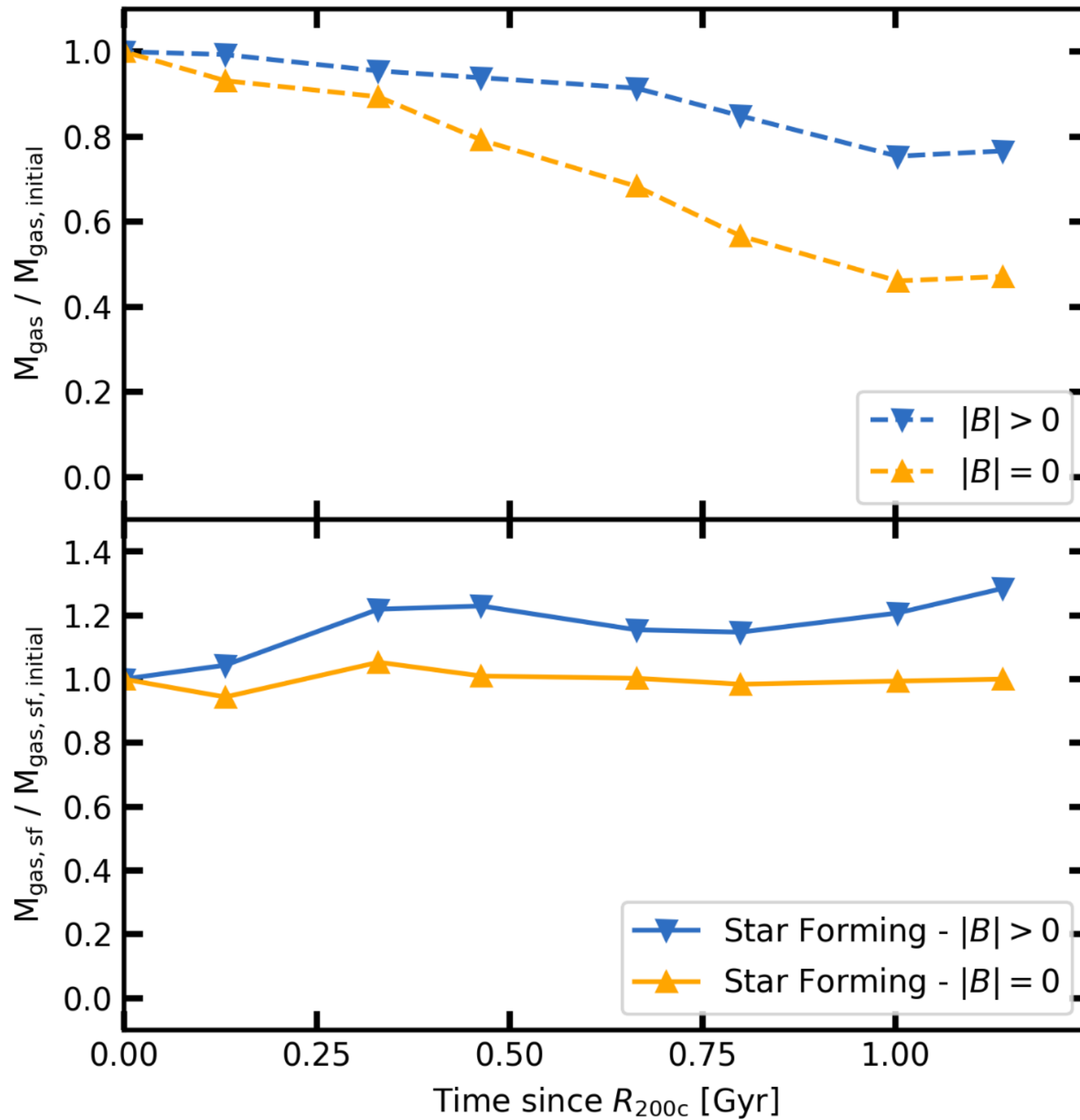
07/07/2025

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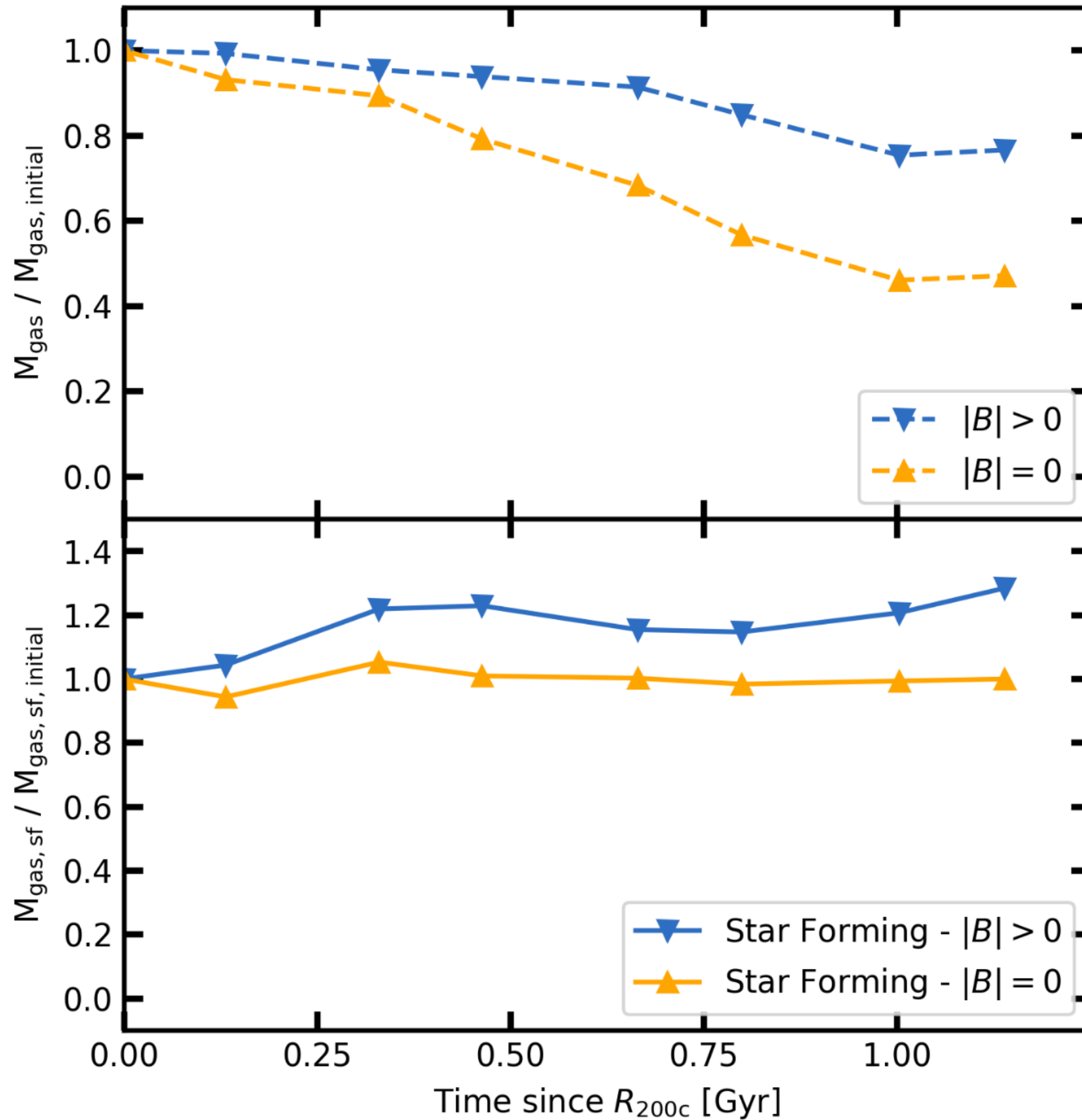
Selecting a Sample

- Selected satellite galaxies which:
 - Came within R_{200c} between $z=0.5$ and $z=0.0$
 - $M_{\text{total,pre-stripping}} \geq 3 \times 10^{10} M_{\odot}$
 - Within the CGM for at least 5 snapshots

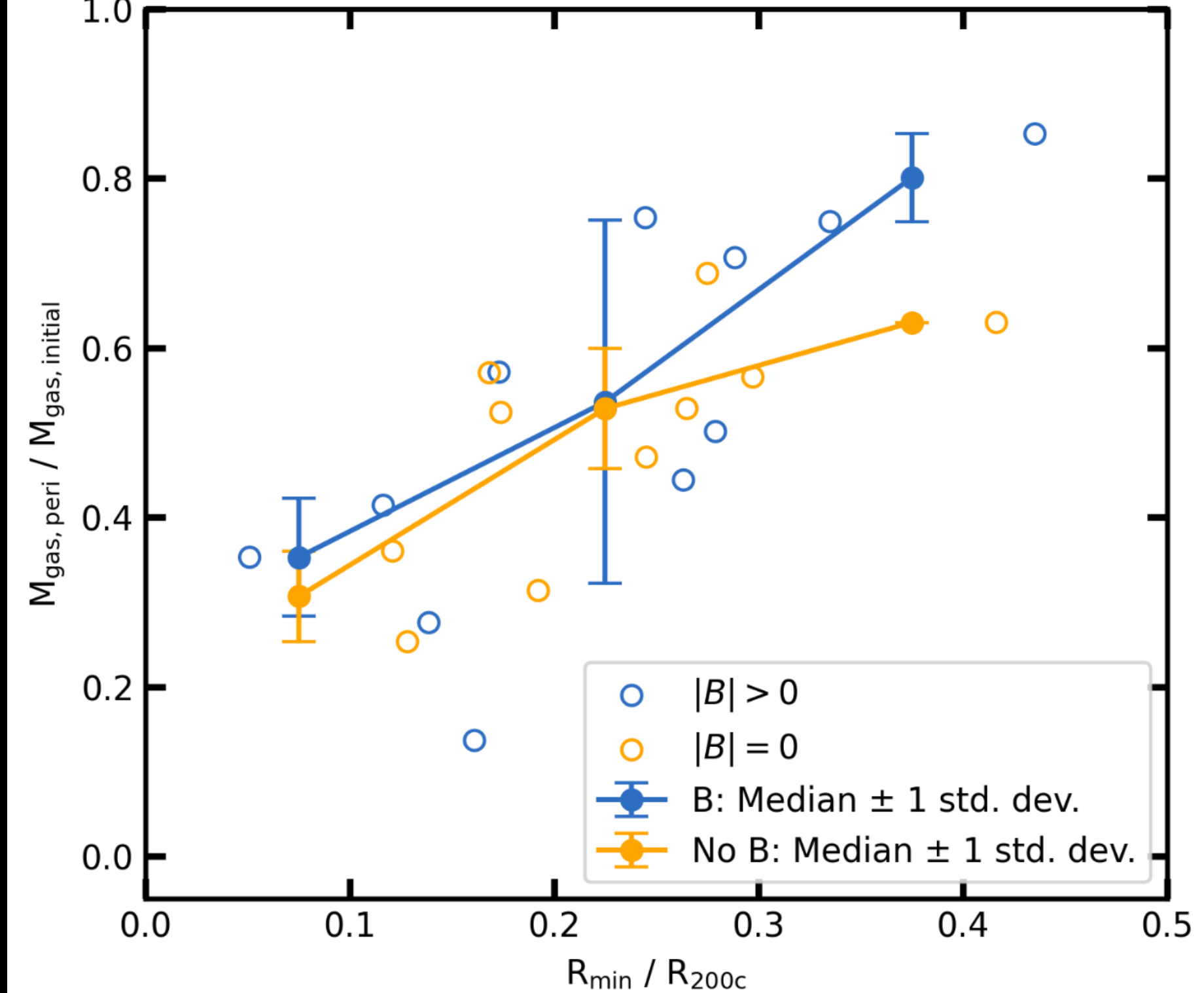
Halo 8: Subhalo 1



Halo 8: Subhalo 1



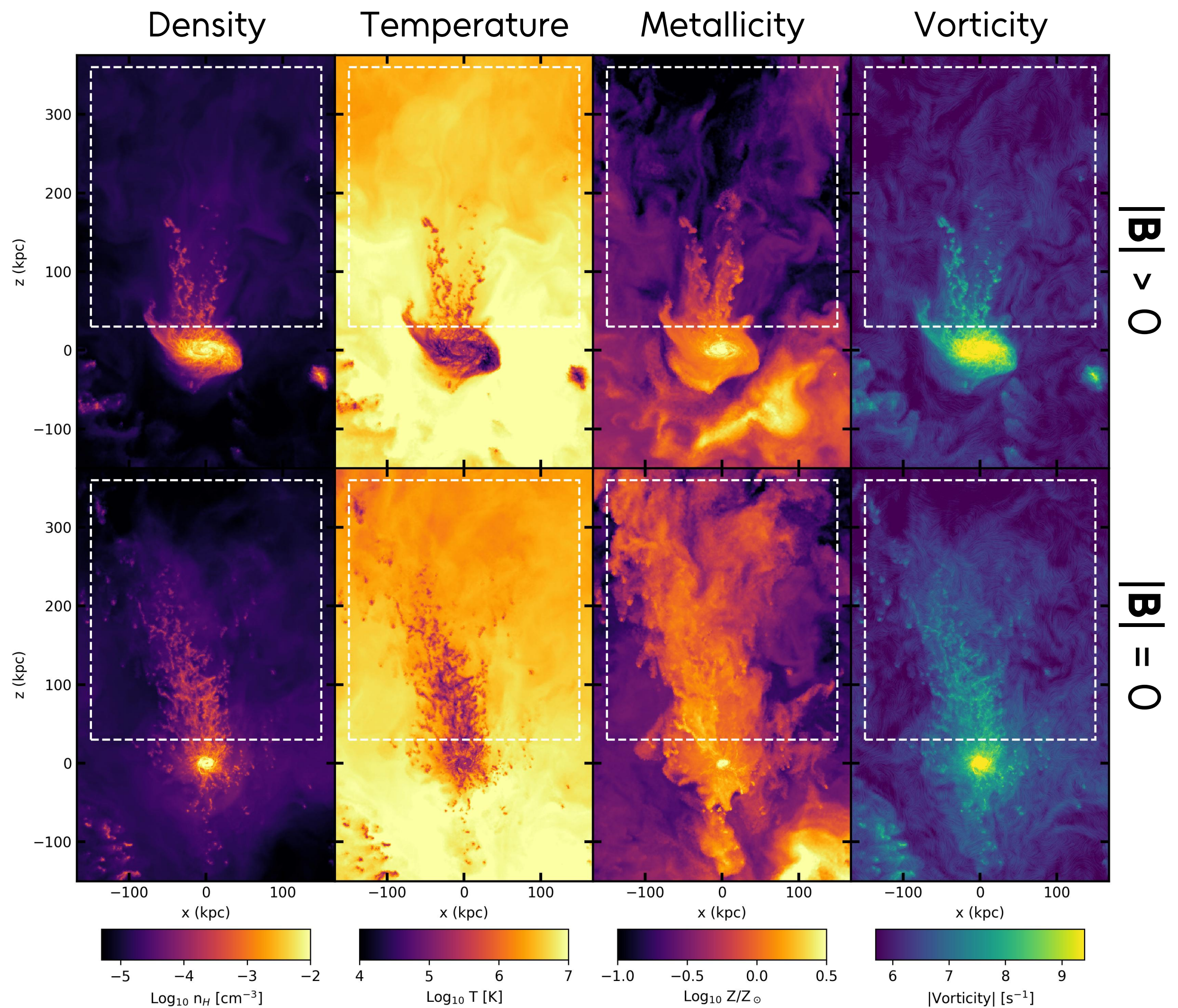
Full sample from all haloes (exc. CGM refinement)



CGM Jellyfish

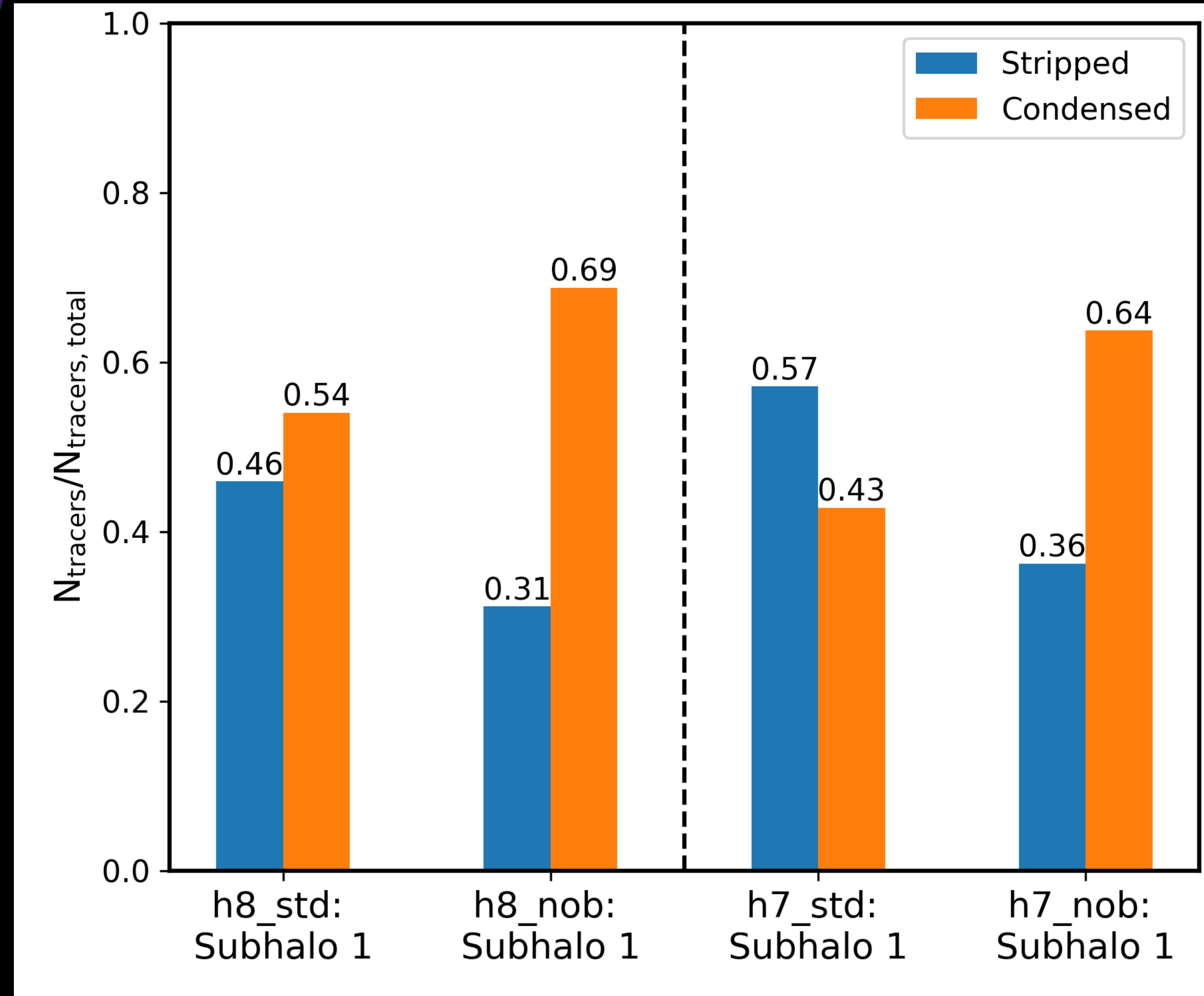
Rintoul et al. (submitted)

07/07/2025

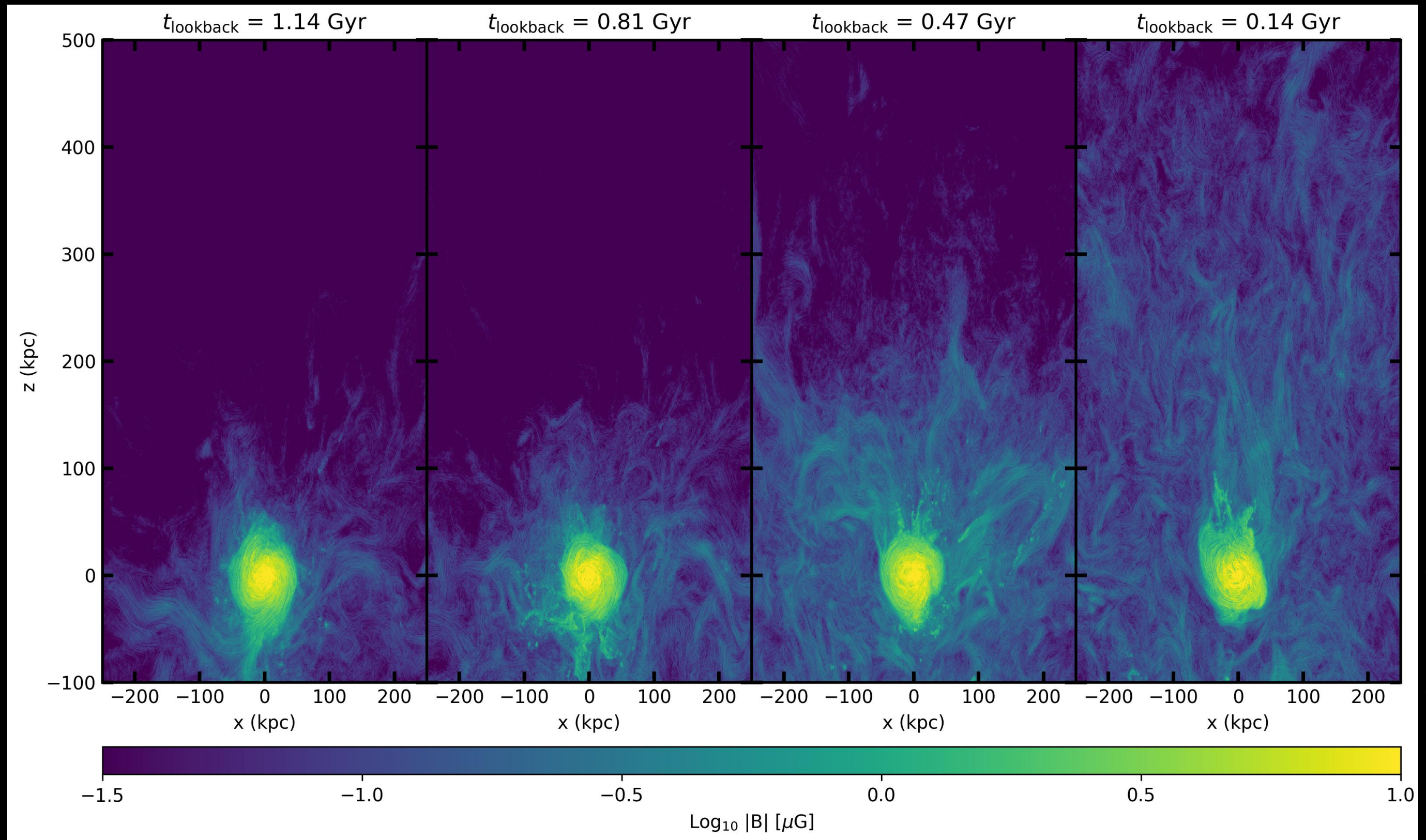


Stripped or Condensed?

- Without B fields
 - Proportion of tracers condensed from the CGM is higher by 15-21%pts
 - Stripped gas mass is approximately double

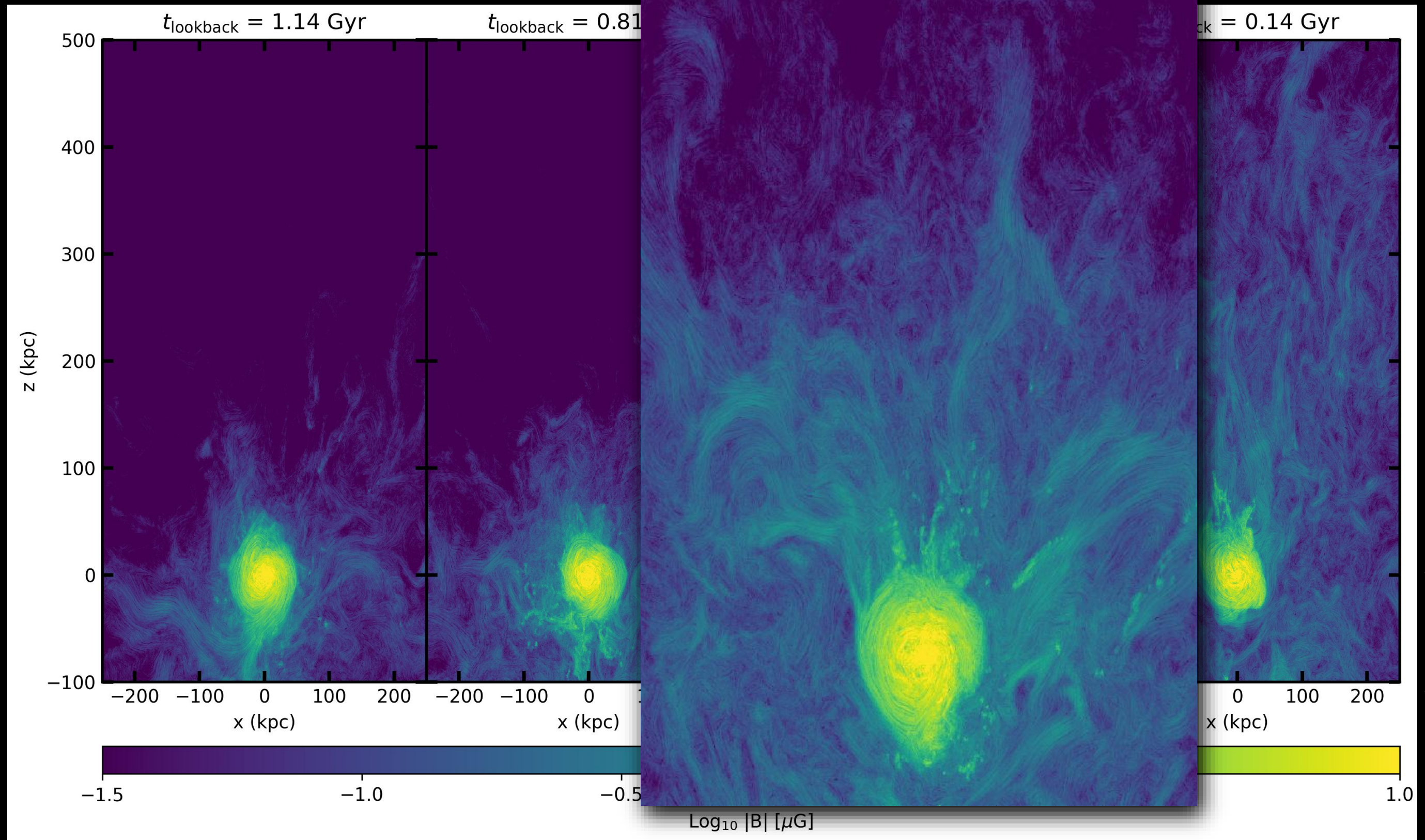


Magnetic Draping



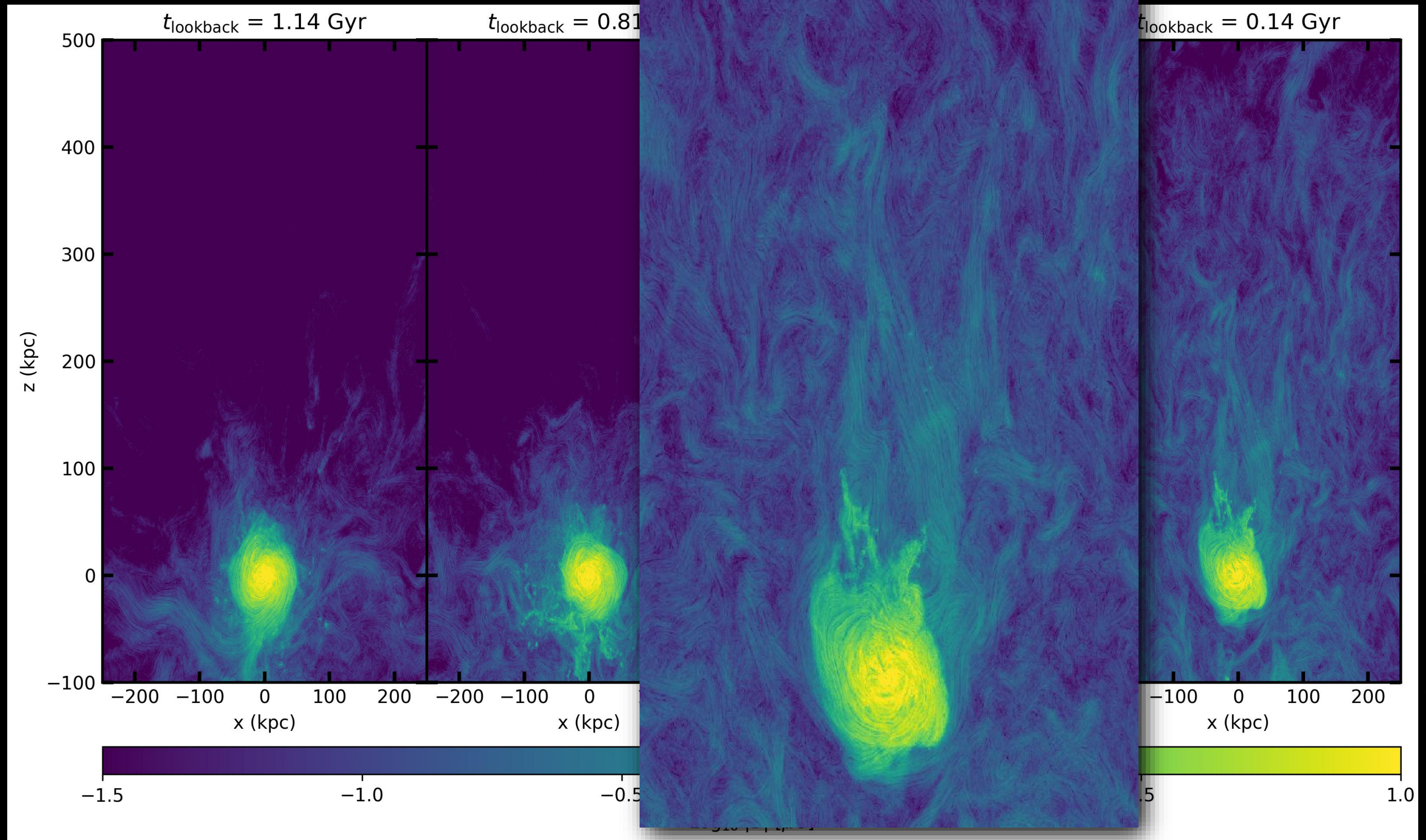
Rintoul et al. (submitted)

Magnetic Draping



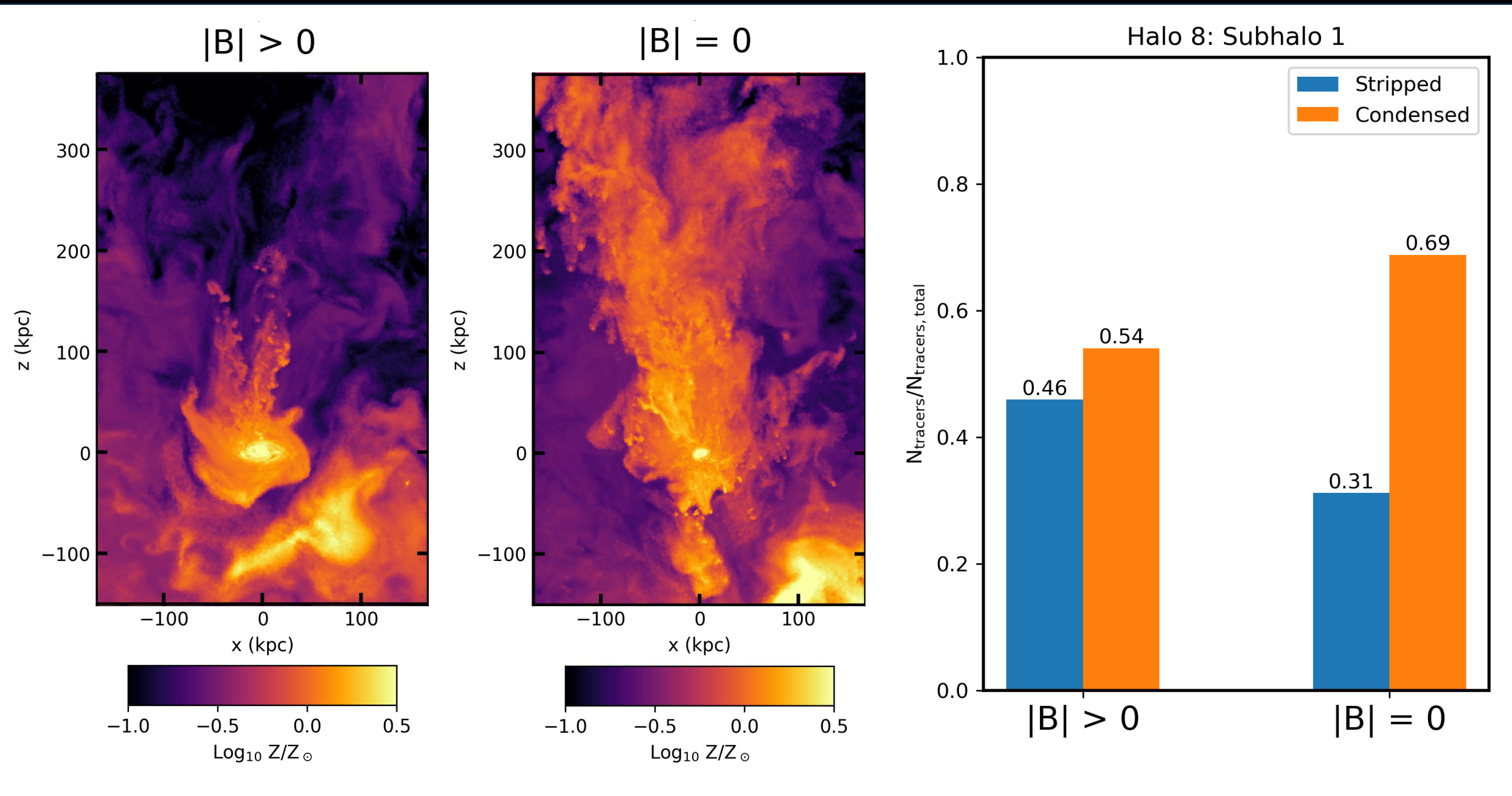
Rintoul et al. (submitted)

Magnetic Draping



Rintoul et al. (submitted)

Thank you!



- In massive satellites, magnetic fields shield gas from stripping through magnetic draping.
- While this is evident for these “CGM Jellyfish”, this does not generalise to all satellite galaxies.
- The tails are also shielded from mixing with the ambient CGM.
- Without magnetic fields, tail morphology is drastically different, particularly in metallicity.



<- Paper on ArXiv now
arxiv:2506.18983

Come chat to me about:

- Magnetic Fields & Satellites
- Thermal Conduction
- Gas Disc Kinematics
- CGM and Galaxy Groups

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