

X-ray Observations of a Group of Galaxies Falling into the Coma Cluster

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400 kpc

$z = 0.79$

TNG simulations

Simulations predict galaxy clusters to merge and grow through time
Can we see this growth in action?



The Coma cluster seen in optical

Coma Cluster

NGC 4839

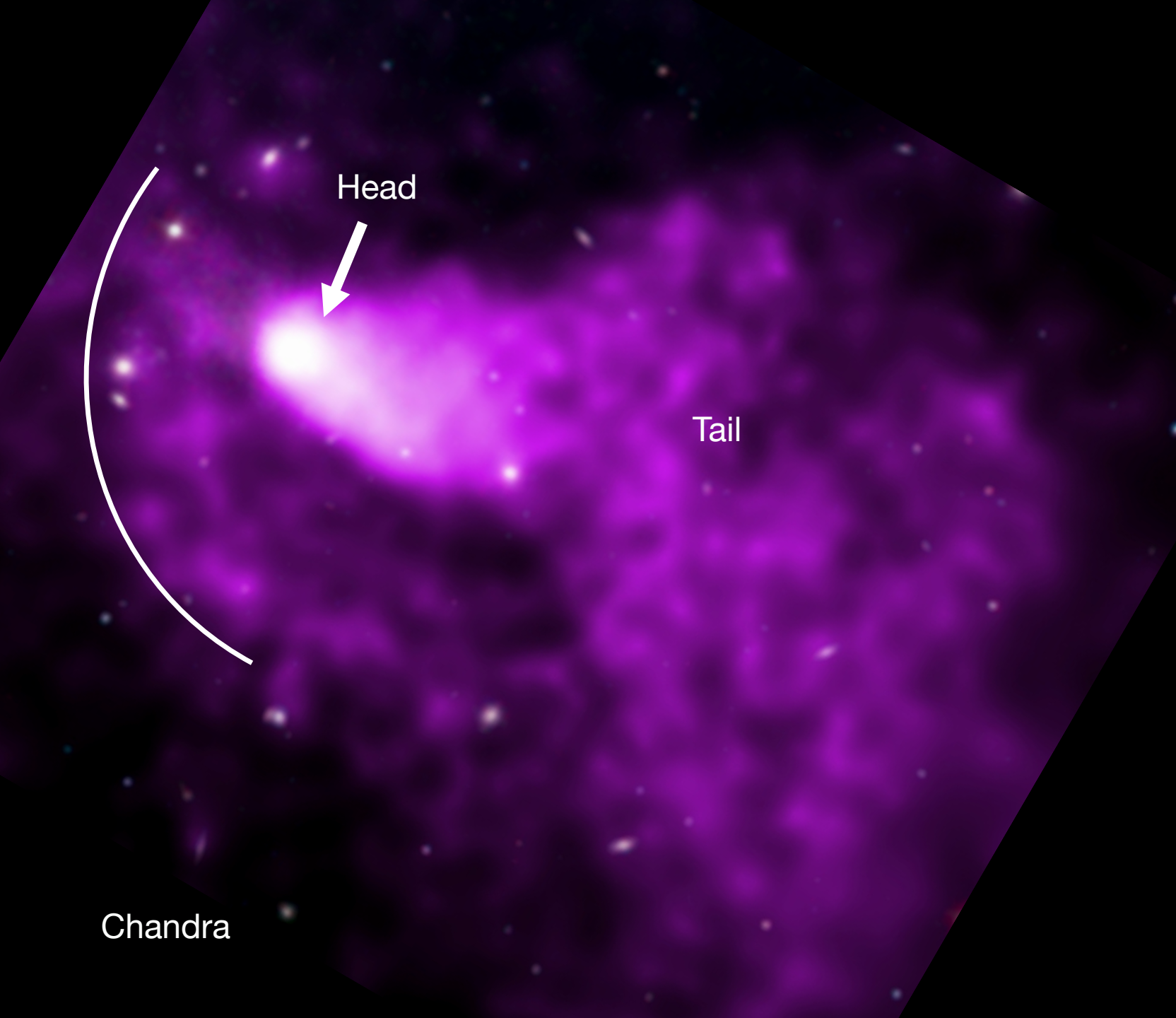
XMM-Newton

The Coma cluster seen in X-rays with XMM-Newton

X-rays provide a view of the hot (100 million K) intracluster medium filling clusters

Allows us to see how galaxy groups move and merge into clusters

The infalling group NGC4839 has a 1.5 million light year long tail behind it

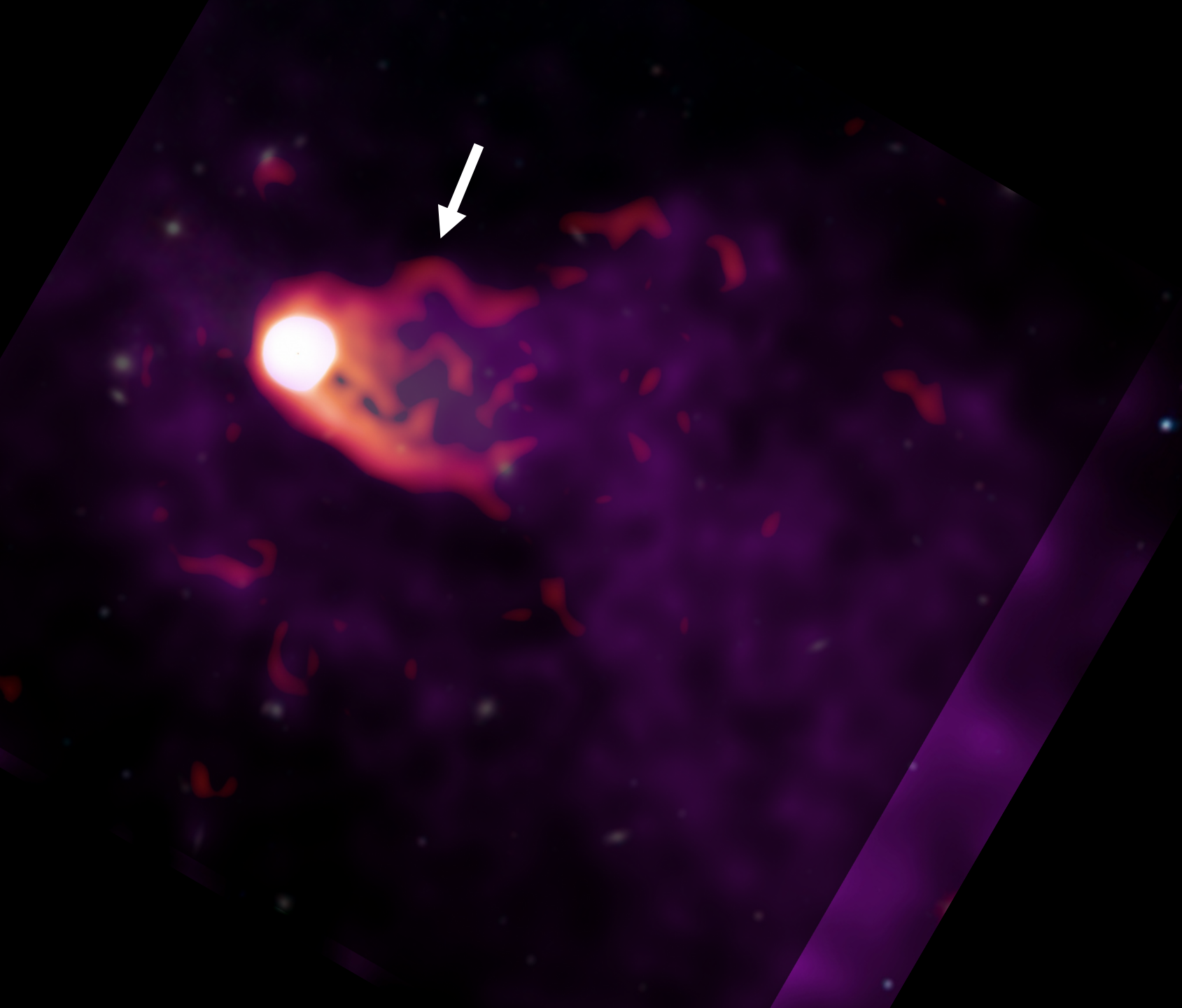


Our new deep Chandra observations of NGC 4839 allow the most detailed study of an infalling group

The Coma cluster's close proximity allows for the highest resolution view of a stripped tail

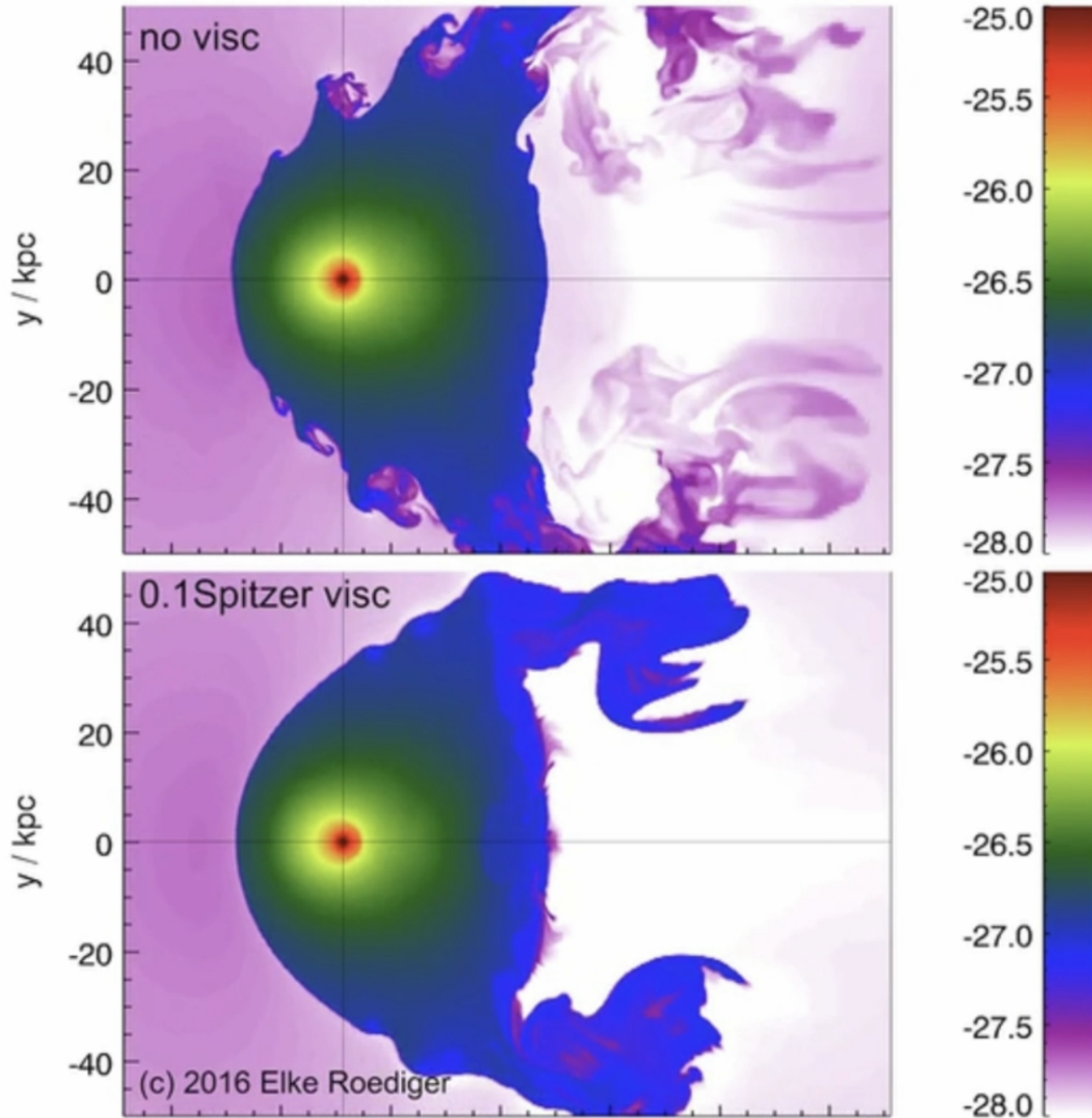
It is preceded by a shock front, indicating it is travelling at 3 million mph.

The tail is gas being stripped from the infalling group as it moves.



Edge detection filtering
reveals ripple structures
similar to Kelvin Helmholtz
instabilities

$\log_{10}(\rho/\text{g cm}^{-3})$ $z=0\text{kpc}$ $t=-1179\text{Myr}$



- Low viscosity leads to lots of Kelvin Helmholtz instabilities and short tail
- Increasing the viscosity leads to fewer Kelvin Helmholtz instabilities and a longer tail

Summary

- Chandra X-ray observations allow us to study how galaxy clusters grow through mergers
- A giant, 1.5 million light year long tail is being stripped from the infalling group NGC4839 moving over 3 million mph.
- By studying the shape of the tail and its instabilities, we can constrain the properties of the gas such as its viscosity
- [Our paper is here: https://arxiv.org/abs/2304.05419](https://arxiv.org/abs/2304.05419)

- Thank you!

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