E.A. Milne Centre for Astrophysics

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UNIVERSITY OF HULL

The Resilience of Cold Fronts to Triple Mergers

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Contents

- Simulation setup
- Sloshing cold fronts in a binary merger
- How many SCFs do we find in an off-axis binary merger?
- How many SCFs do we find in a system that’s undergone two mergers?

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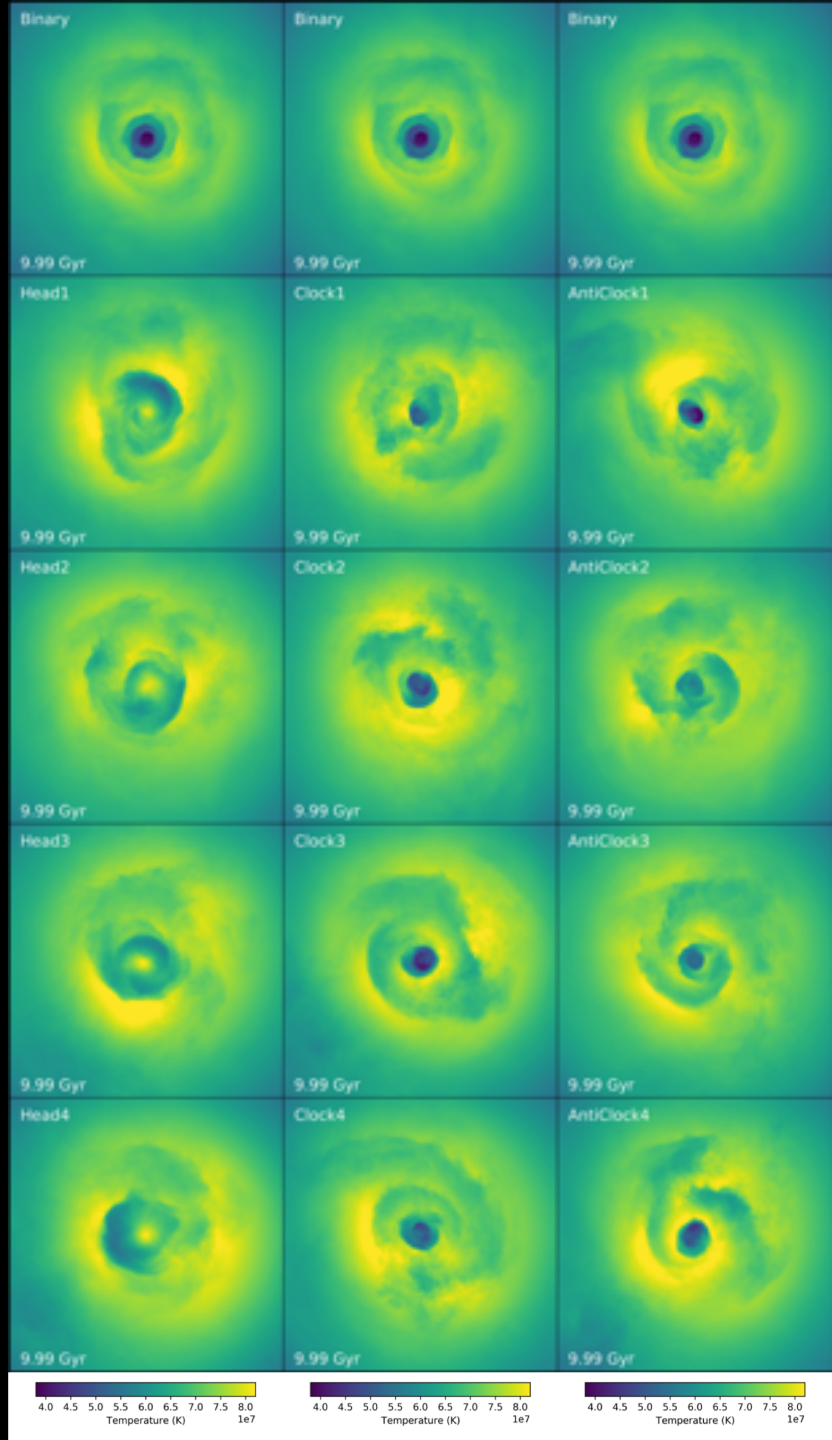
The simulations

- Binary Merger (1:10)
- Triple Mergers (1:10 followed by 1:10)
- FLASH code (University of Chicago)
- Hydrodynamic ICM + N-body Dark Matter



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Off axis binary minor merger

- r = 1:10

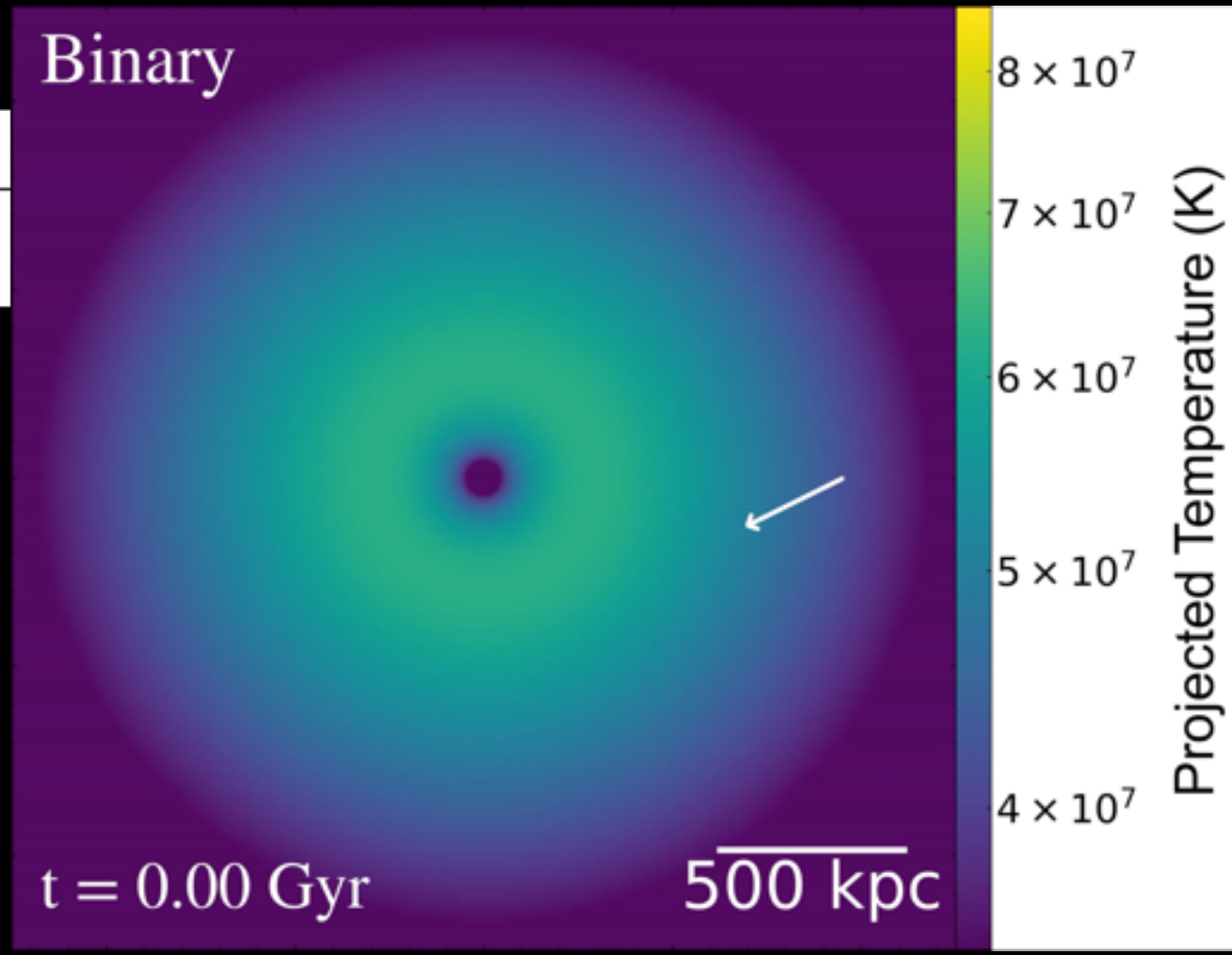
Cluster	$M_{200}(M_\odot)$	R_{200}(kpc)	N_p	Particle Mass($M_\odot$)
1	5×10^{14}	1637	5×10^{6}	1.30×10^{8}
2	5×10^{13}	760	5×10^{5}	1.21×10^{8}

- Tangential velocity, $V_\perp = 0.71 V_c$

- Spatial resolution:

  Maximum grid size of 101 kpc

  Minimum grid size of 3.7 kpc



Link to movie

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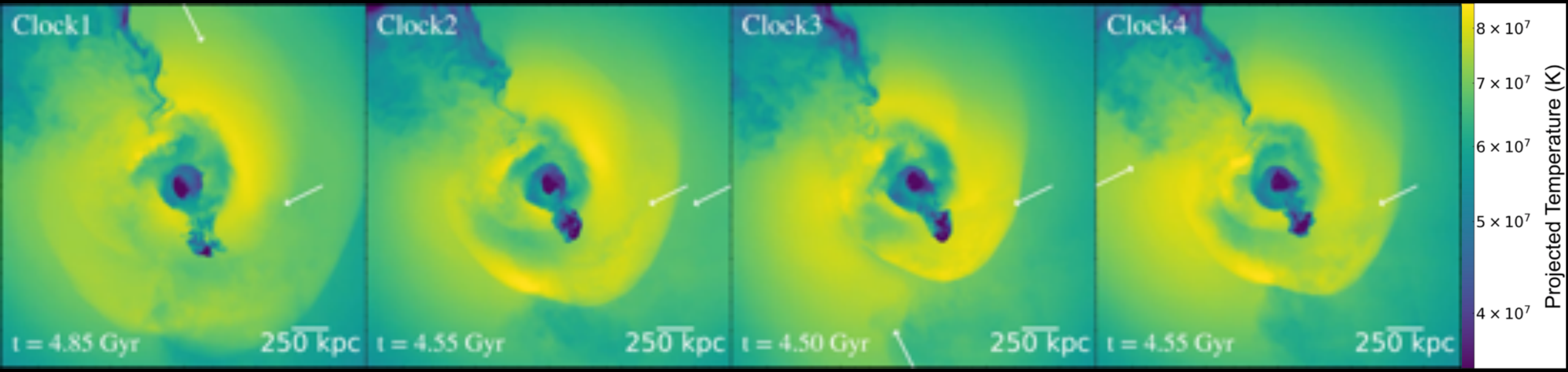
Clockwise second infallers

Link to movie



- Tracing angular momentum of infaller is difficult
- Large scale CFs survive, small scale CFs are re-generated

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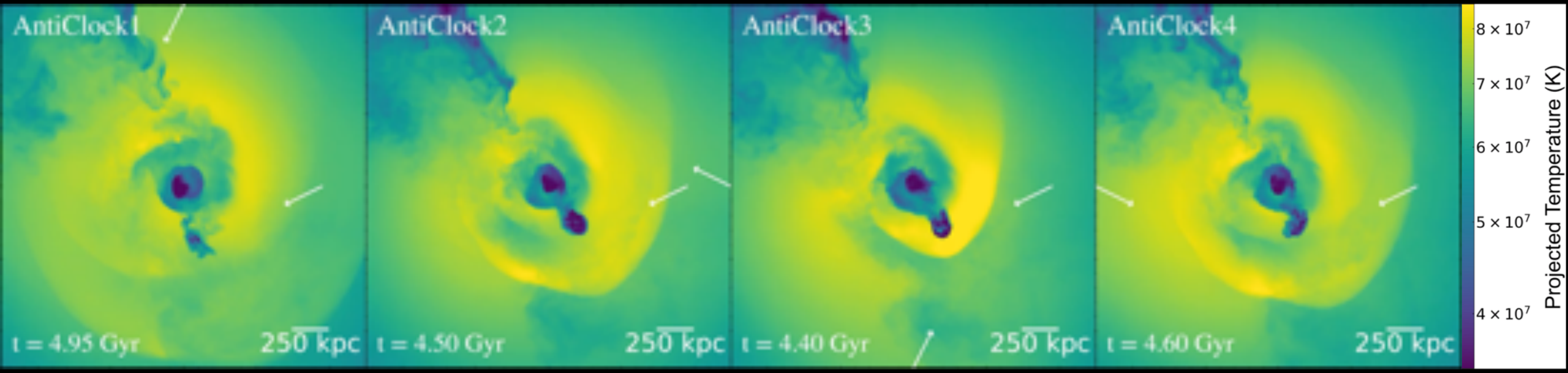
Anti-clockwise second infallers

Link to movie



- Tracing angular momentum of infaller is difficult
- Large scale CFs survive, small scale CFs are re-generated

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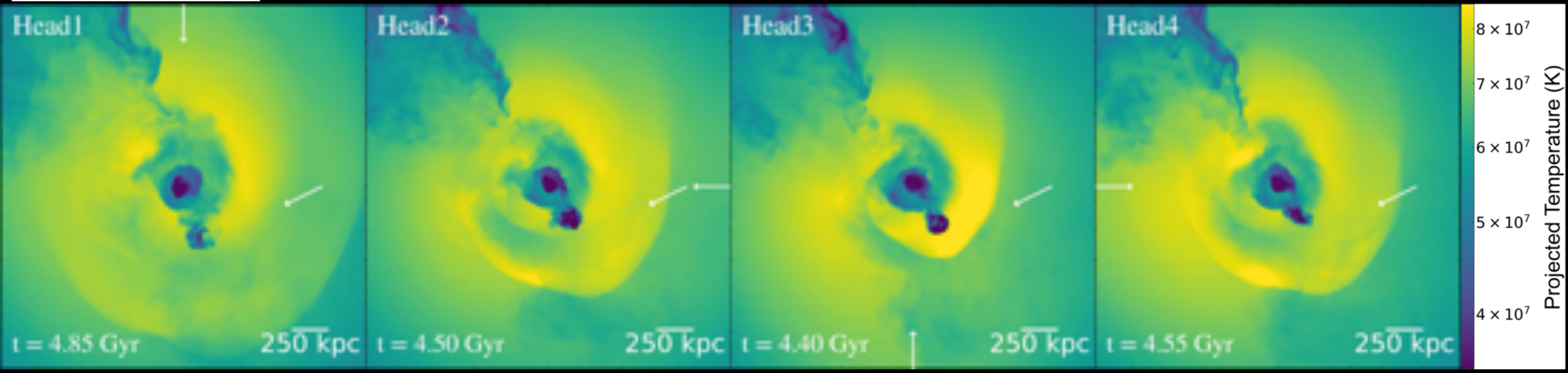
Head-on second infallers

Link to movie



- Head on mergers disrupt cool cores
- Large scale CFs survive

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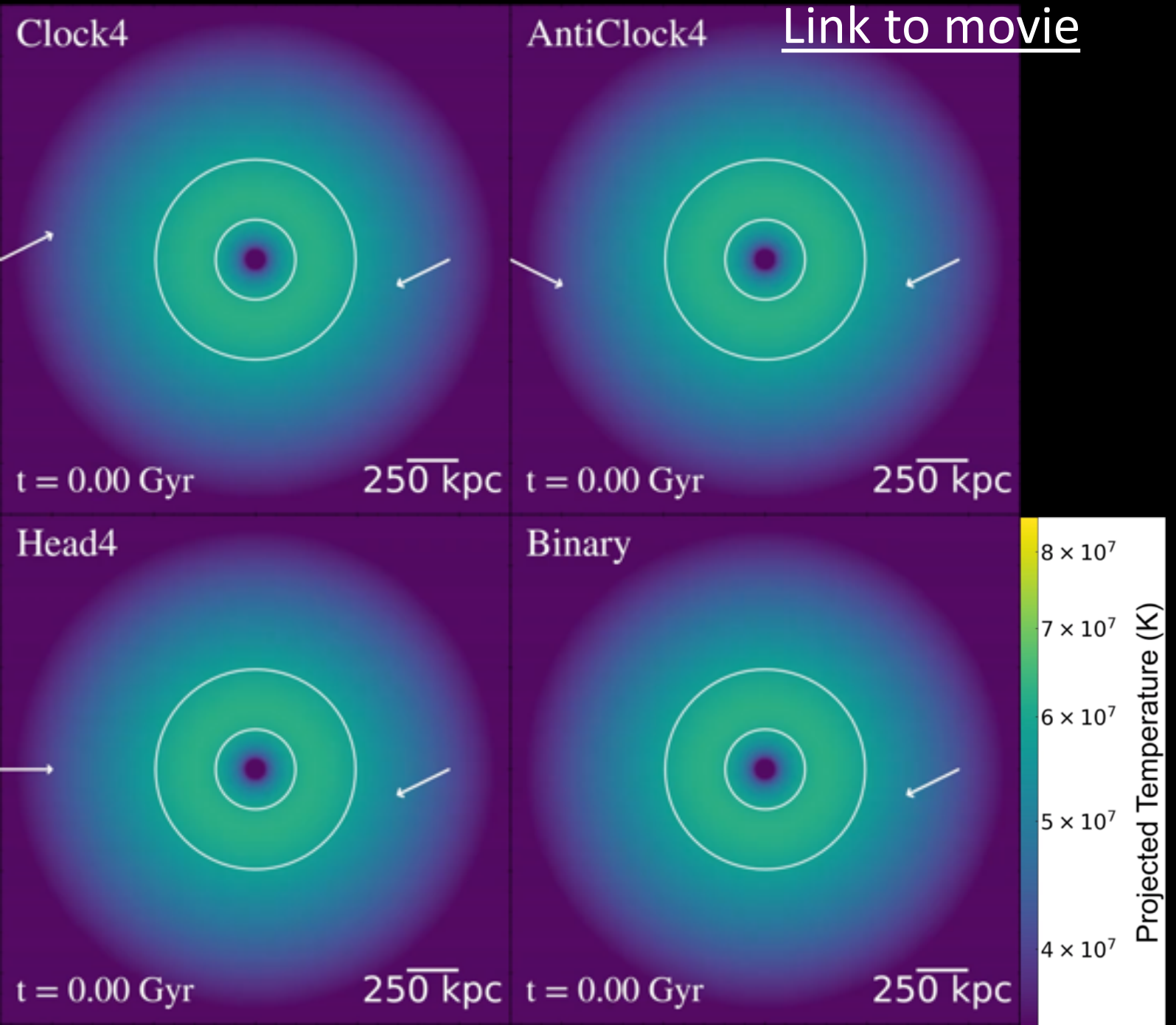

Link to movie

Overview

- Head on mergers disrupt cool cores, but not necessarily sloshing fronts
- Tracing angular momentum of infaller is difficult
- Large scale cold fronts survive

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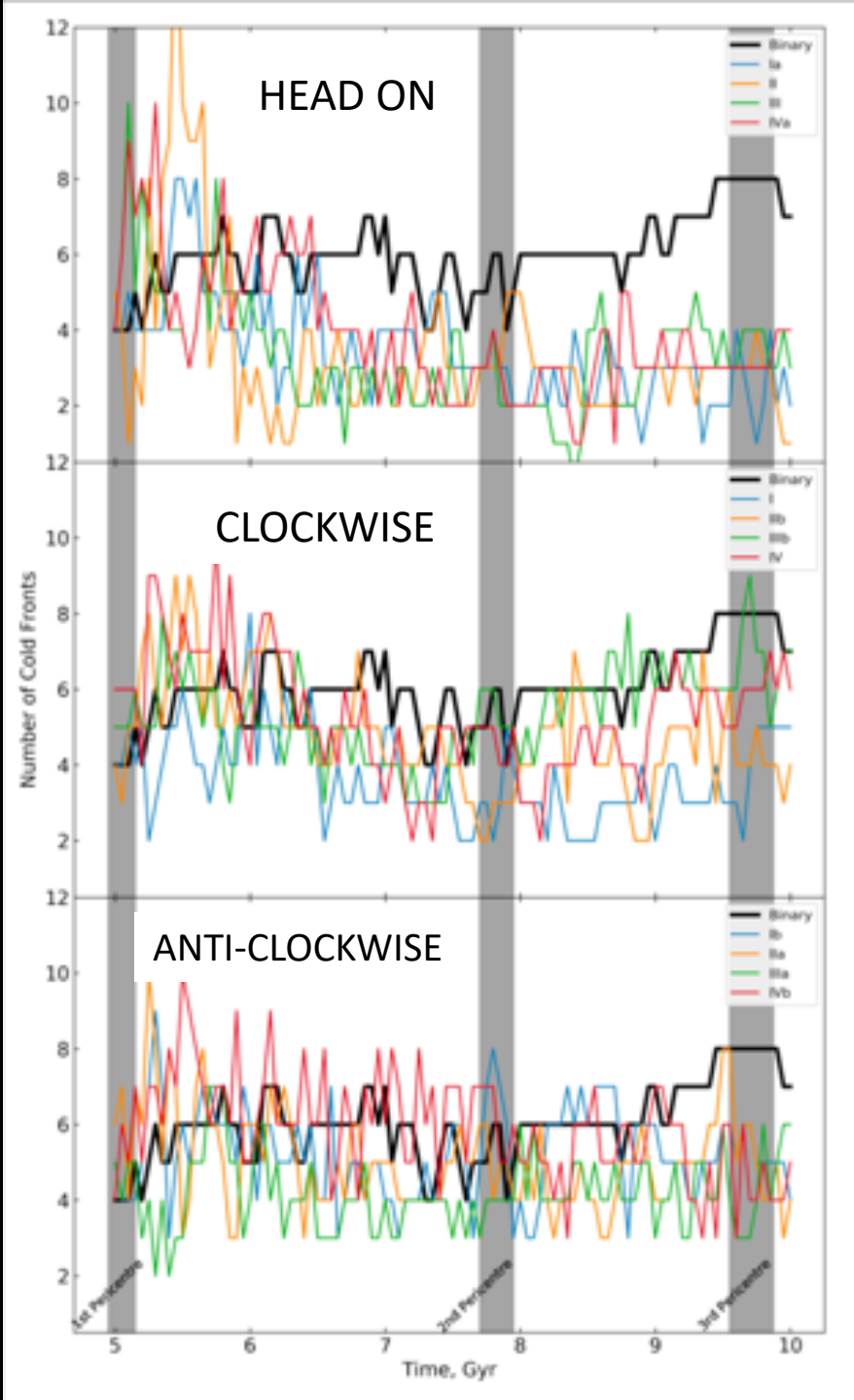
Automated Counting of CFs

- A simple off-axis minor binary produces more easily detectable CFs if not subjected to another merger
- Subsequent head-on mergers disrupt cool cores & reduce the number of easily identified CFs
- CFs at large cluster-centric radii appear resilient to subsequent mergers



Summary

- The number of CFs in a cluster is fairly resilient to subsequent off-axis minor mergers
- Head on mergers destroy cool cores – but not sloshing
- Visual inspection alone can’t easily disentangle merger histories
- Thanks for listening
- Questions? I.M.Vaezzadeh@hull.ac.uk

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