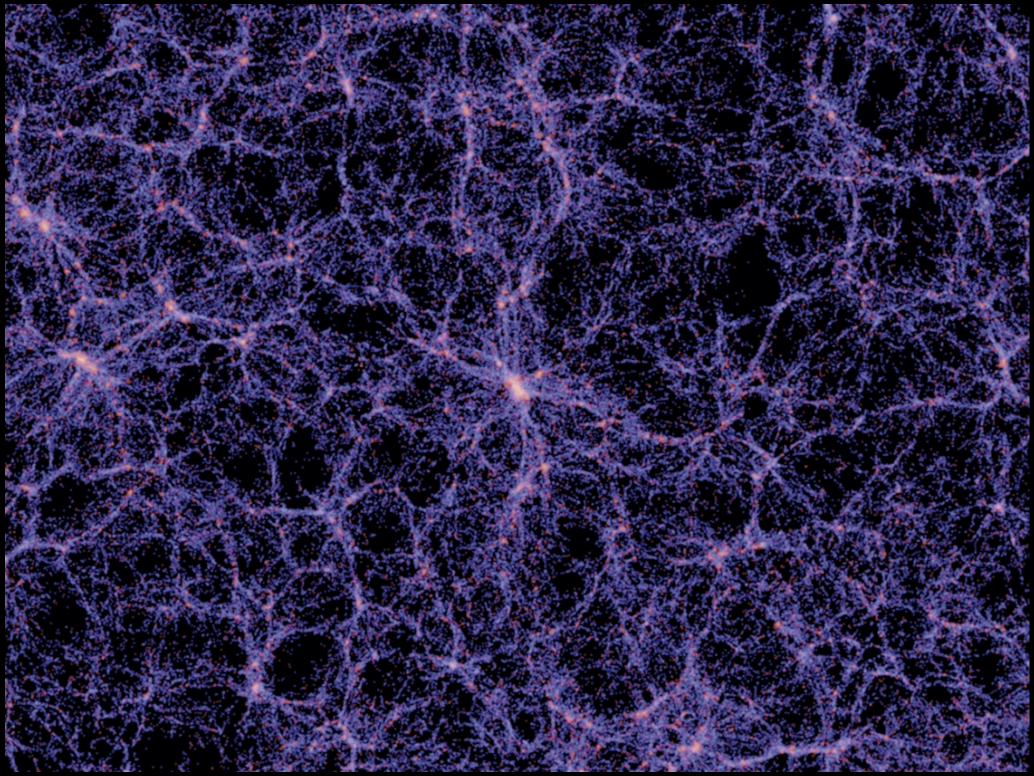
The Cosmic Web



Maciej Soltynski

ASSA Symposium

2018

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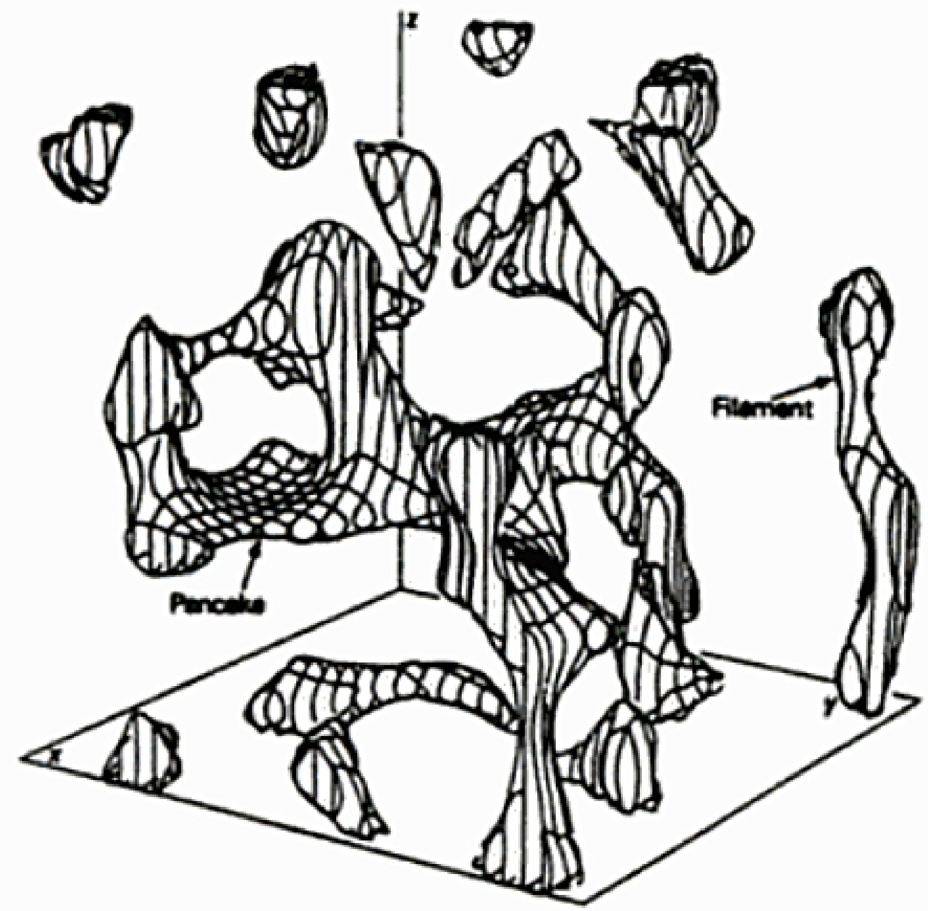

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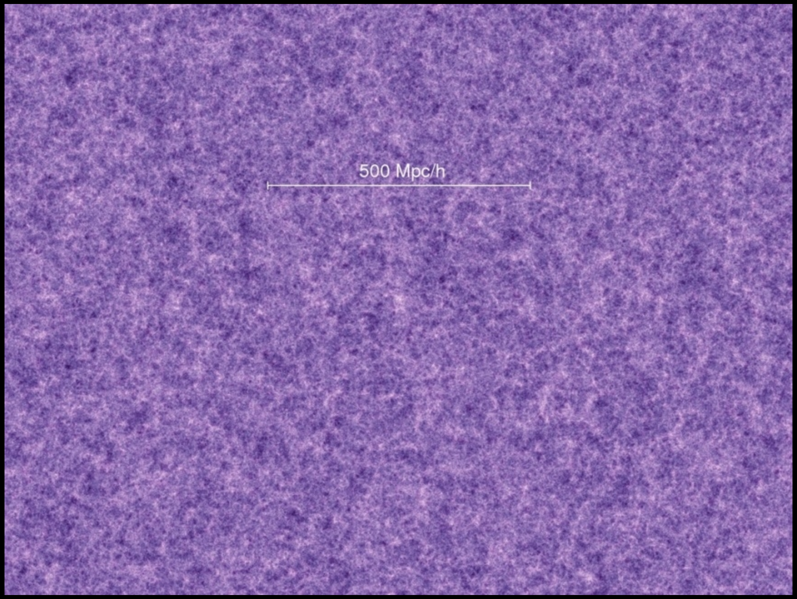
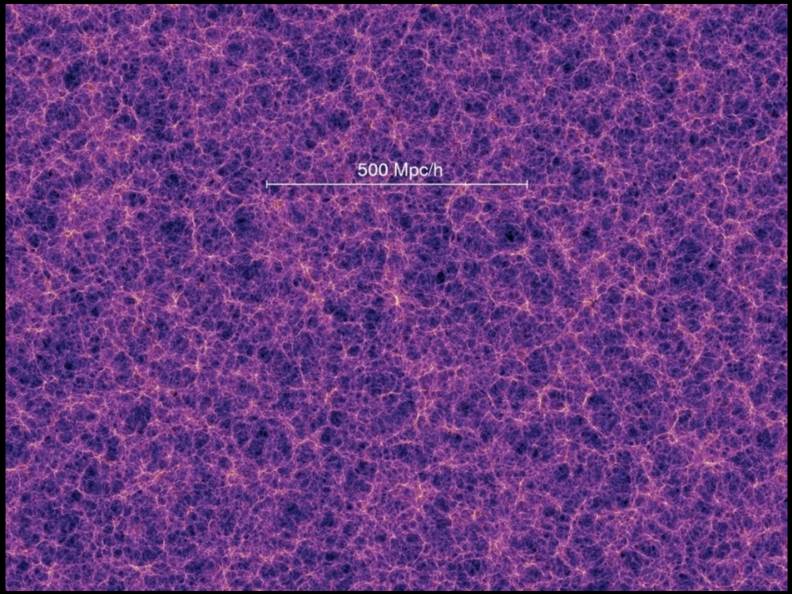
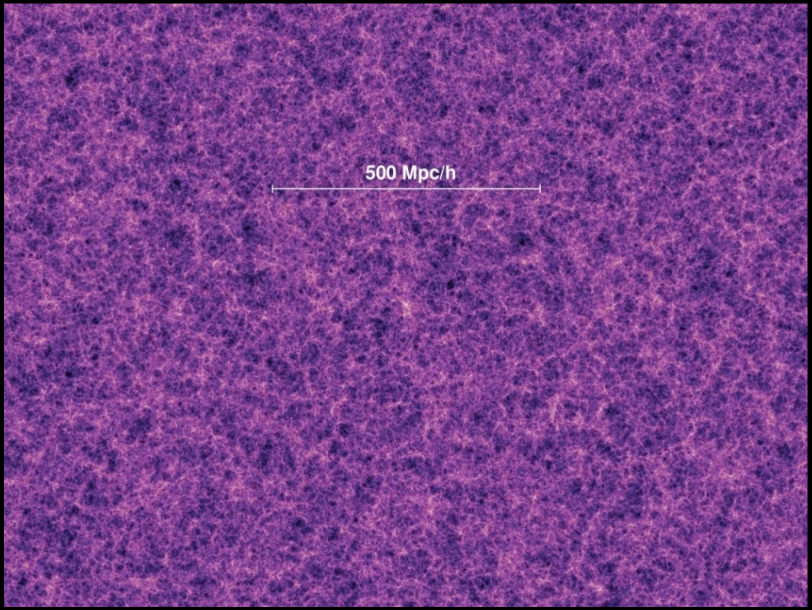


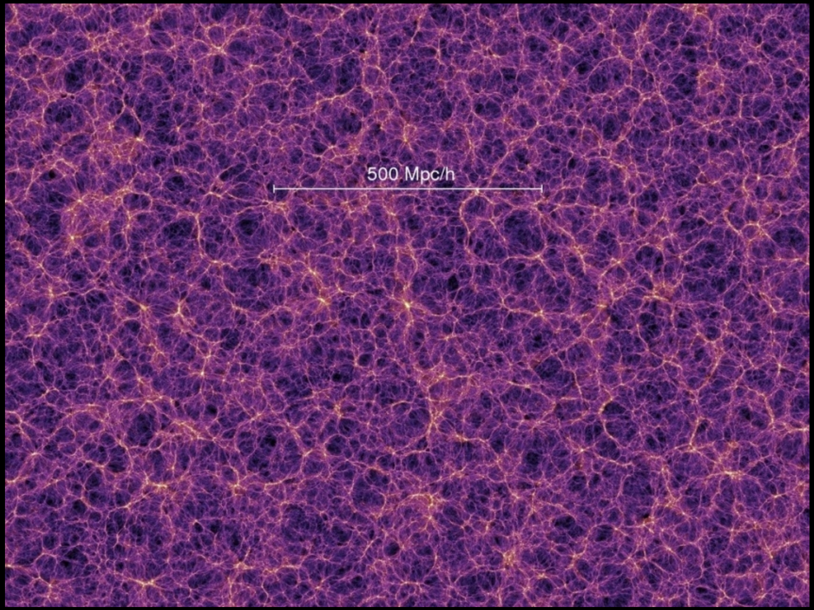
z=1.4 t = 4.7 Gyr

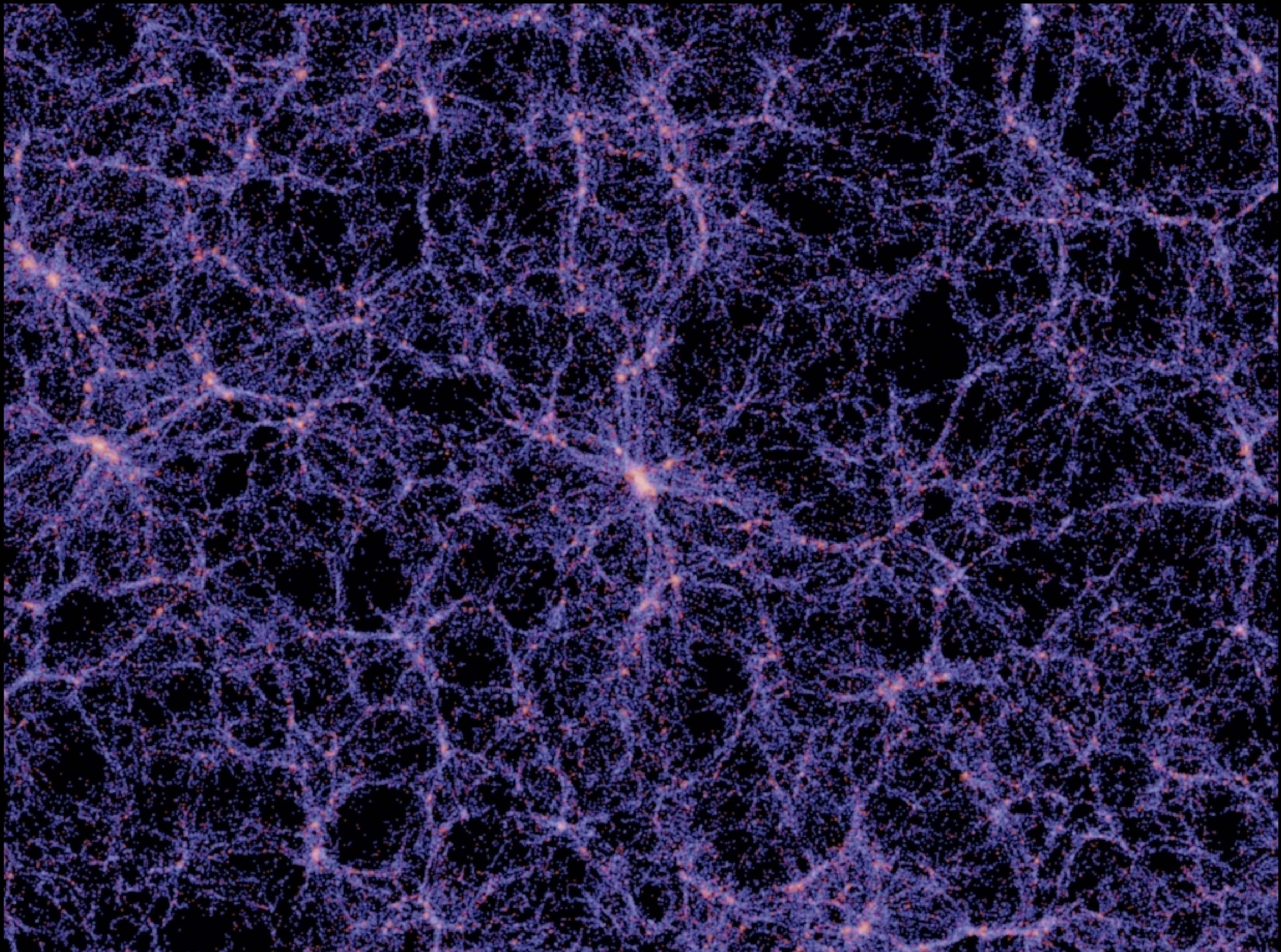


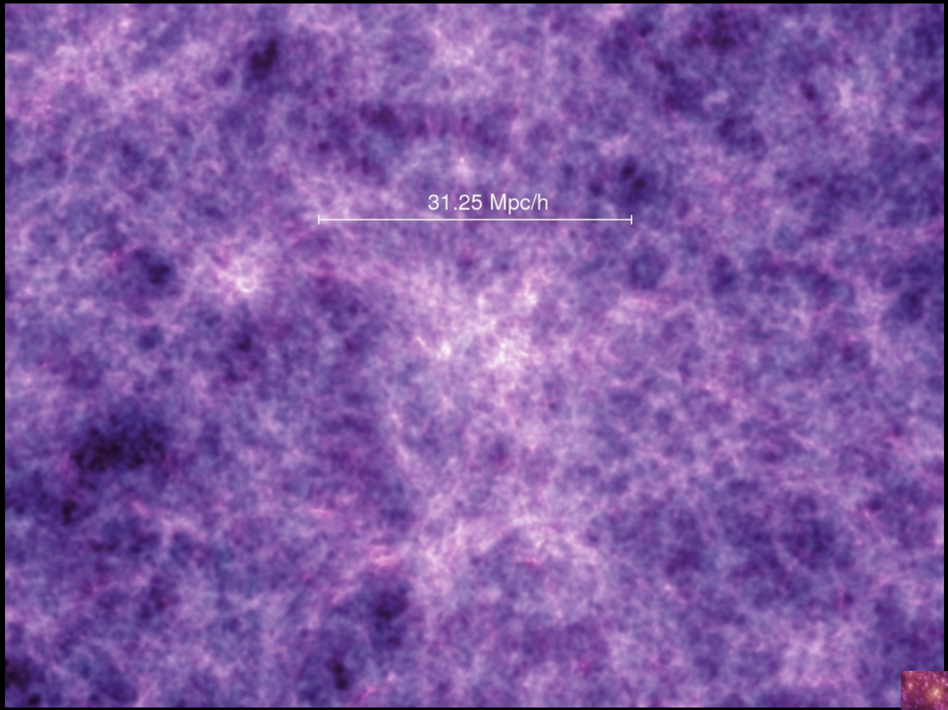
z=5.7 t = 1.0 Gyr



z=0 t = 13.6 Gyr







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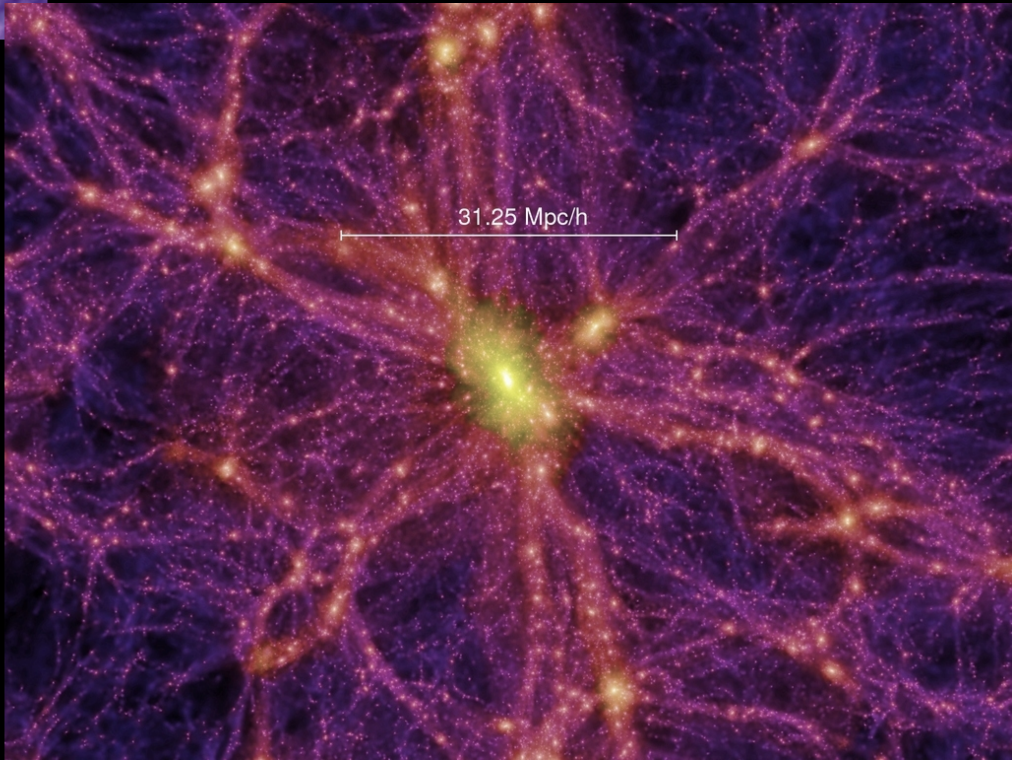

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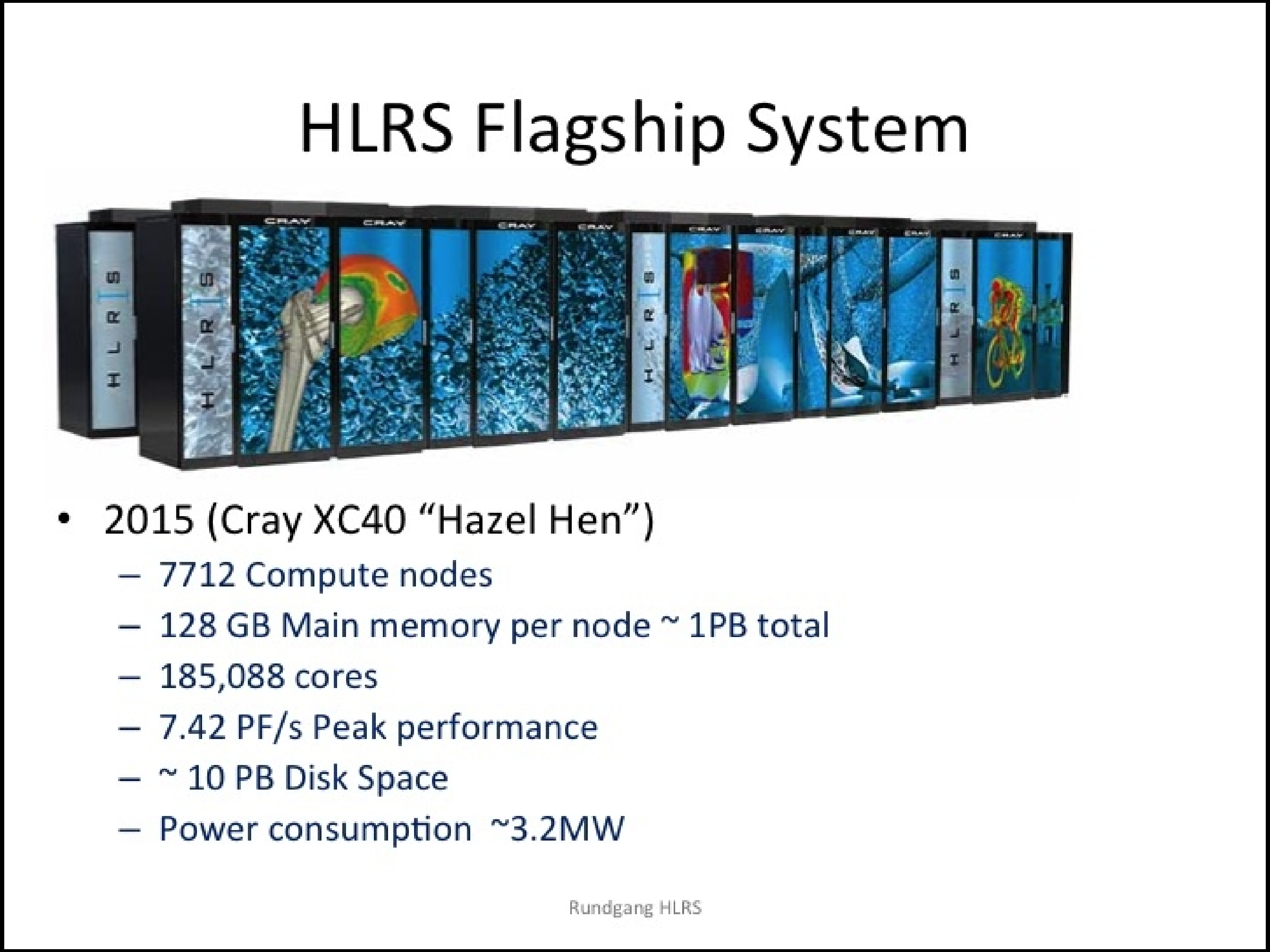
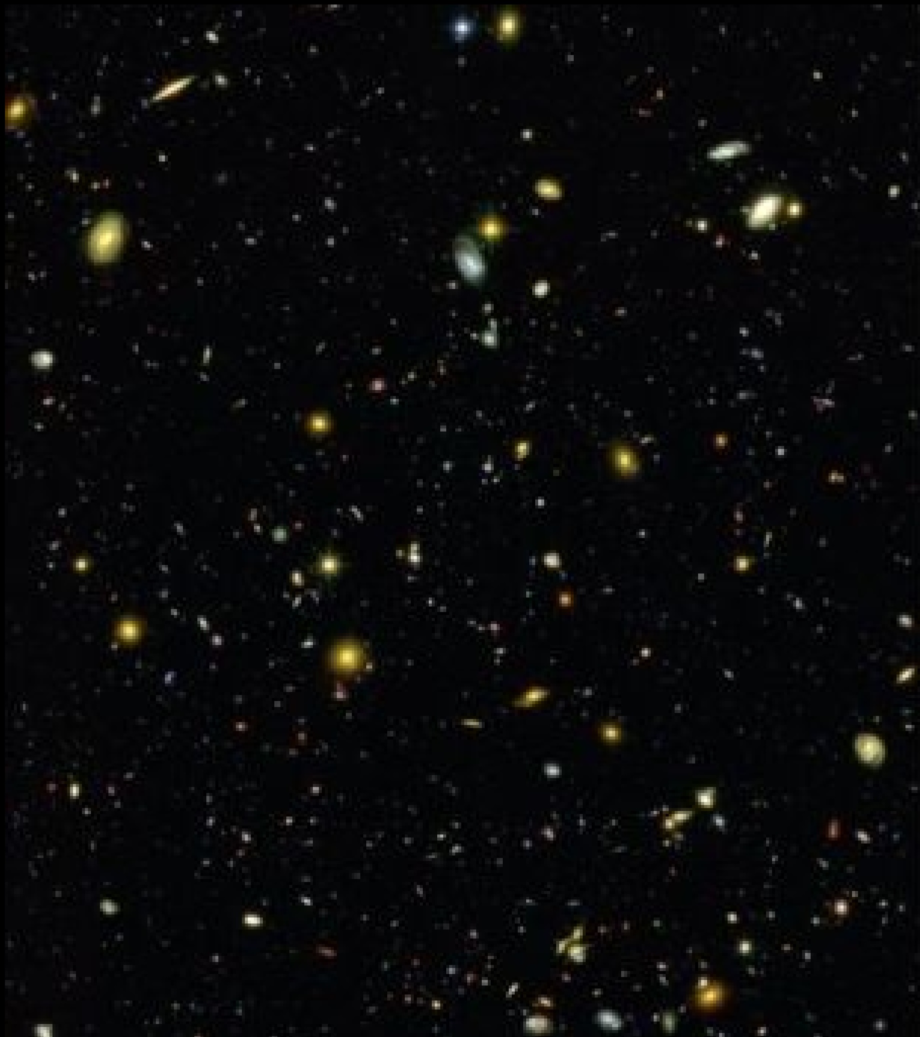
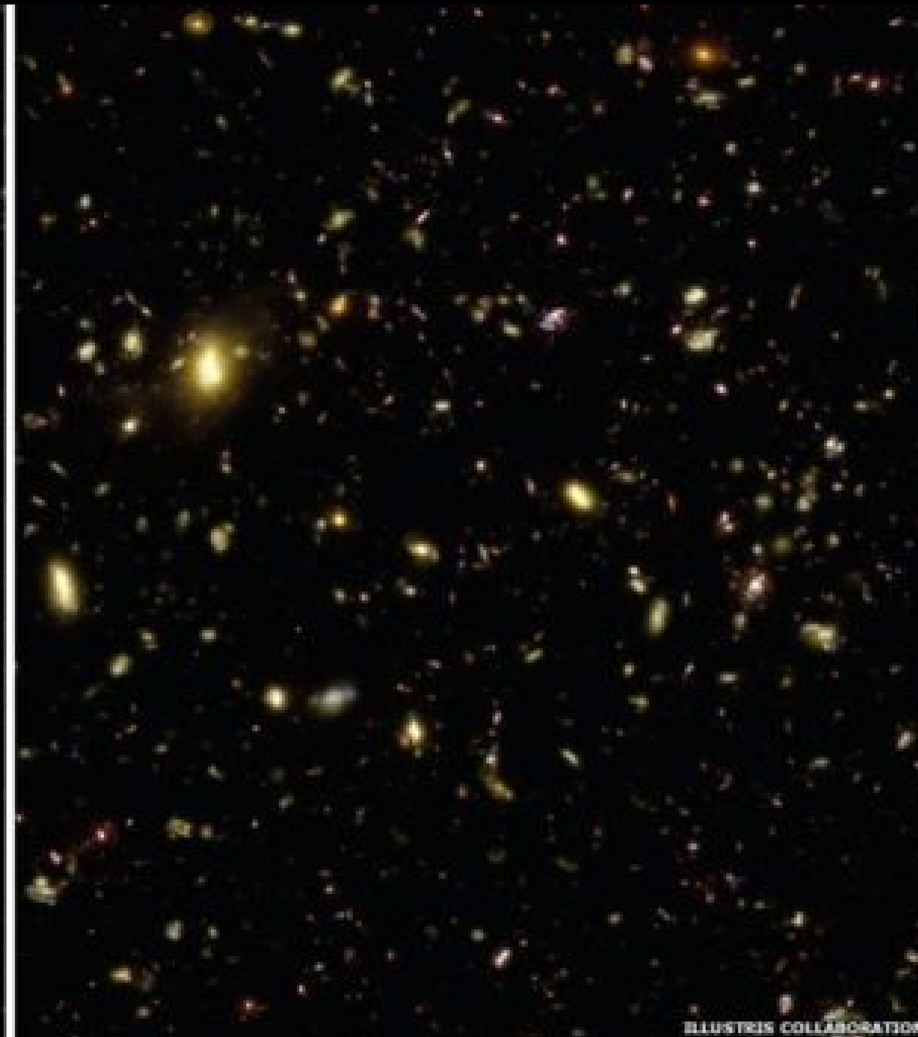


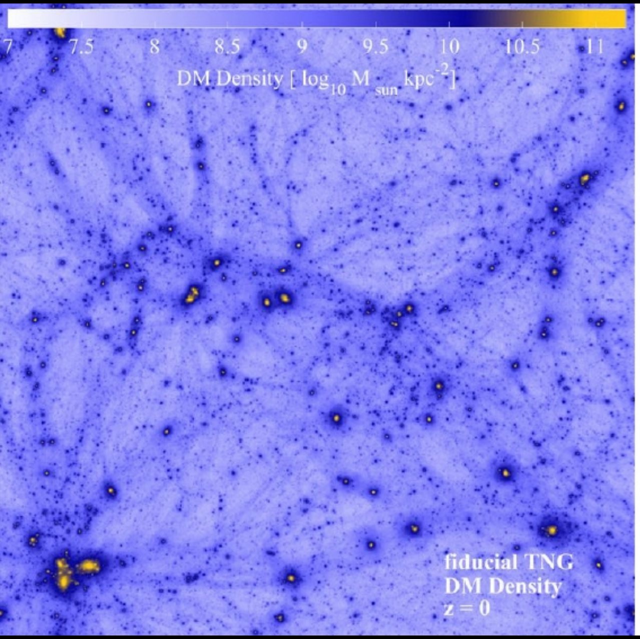


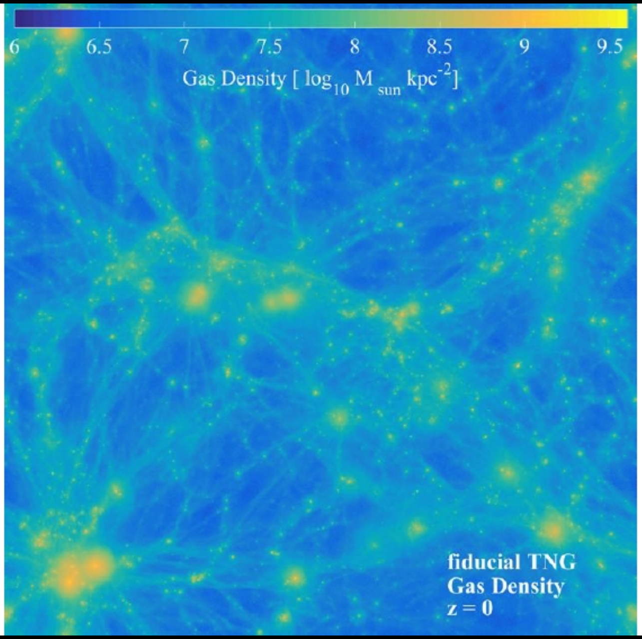
HST

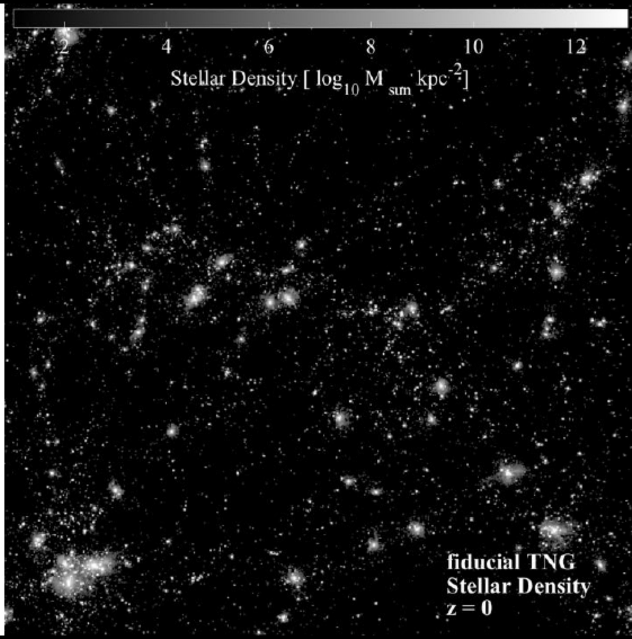


Illustris

IllustrisTNG 2107



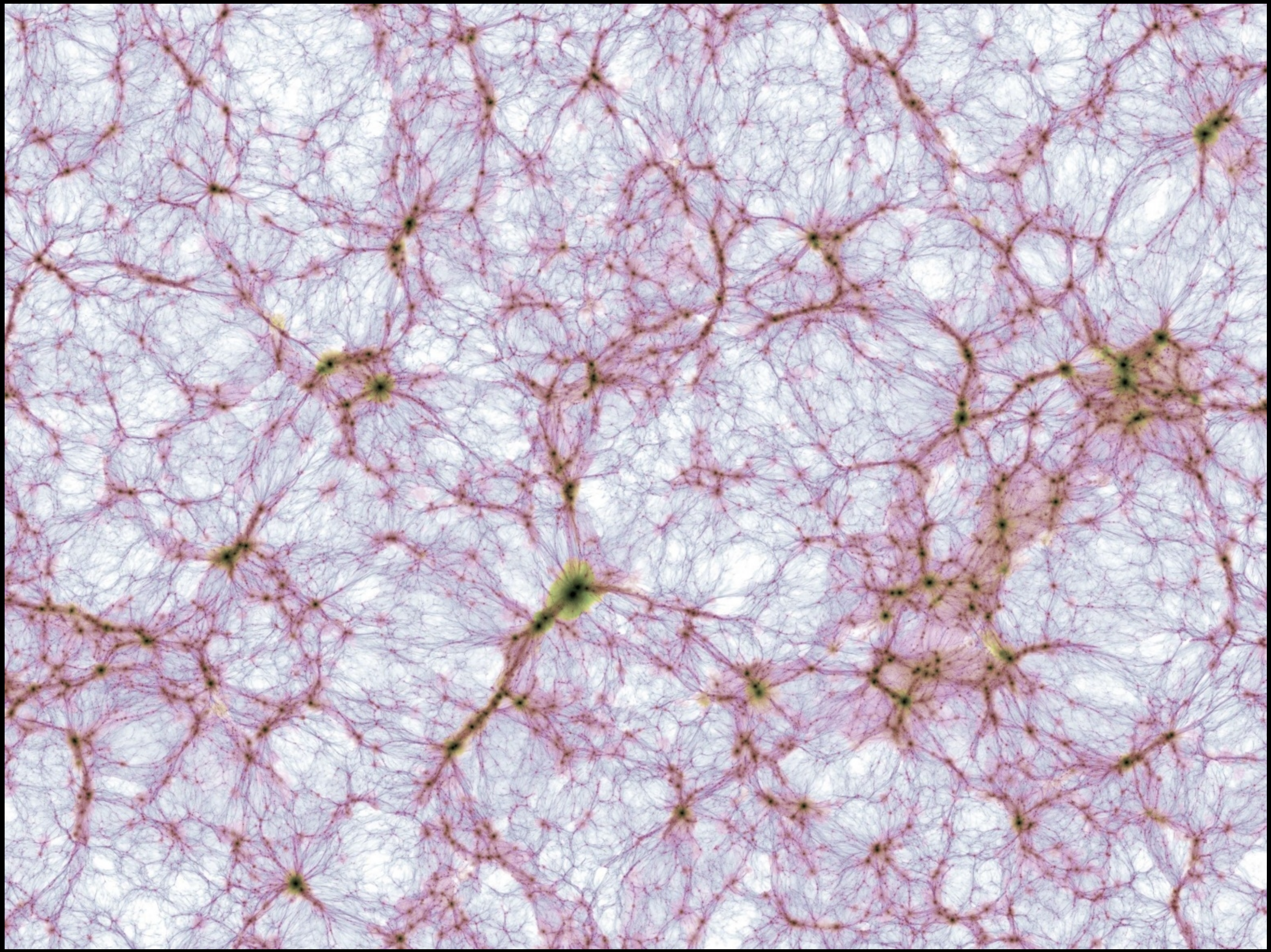




DM density Gas density Stellar density

37 Mpc

IllustrisTNG 2107



Cosmic large-scale structure. The baryonic density field, where image ‘brightness’ indicates mass density and color hue visualizes gas temperature.

The region is about 375 Mpc (1.2B ly) across

So, is the Cosmic Web just a simulation effect?

Or is it real?

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"As the number of galaxies mapped in three dimensions grew from hundreds to thousands to tens of thousands large scale structures began to emerge. It appeared that galaxies were not distributed uniformly throughout space. Rather there were huge voids, like vast bubbles where there were no galaxies at all, and long filaments and sheets filled with galaxies. The largest structure of all, known as the "Great Wall" of galaxies was discovered and reported in 1989, which is when Geller's and Huchra's project came to the attention of the media."

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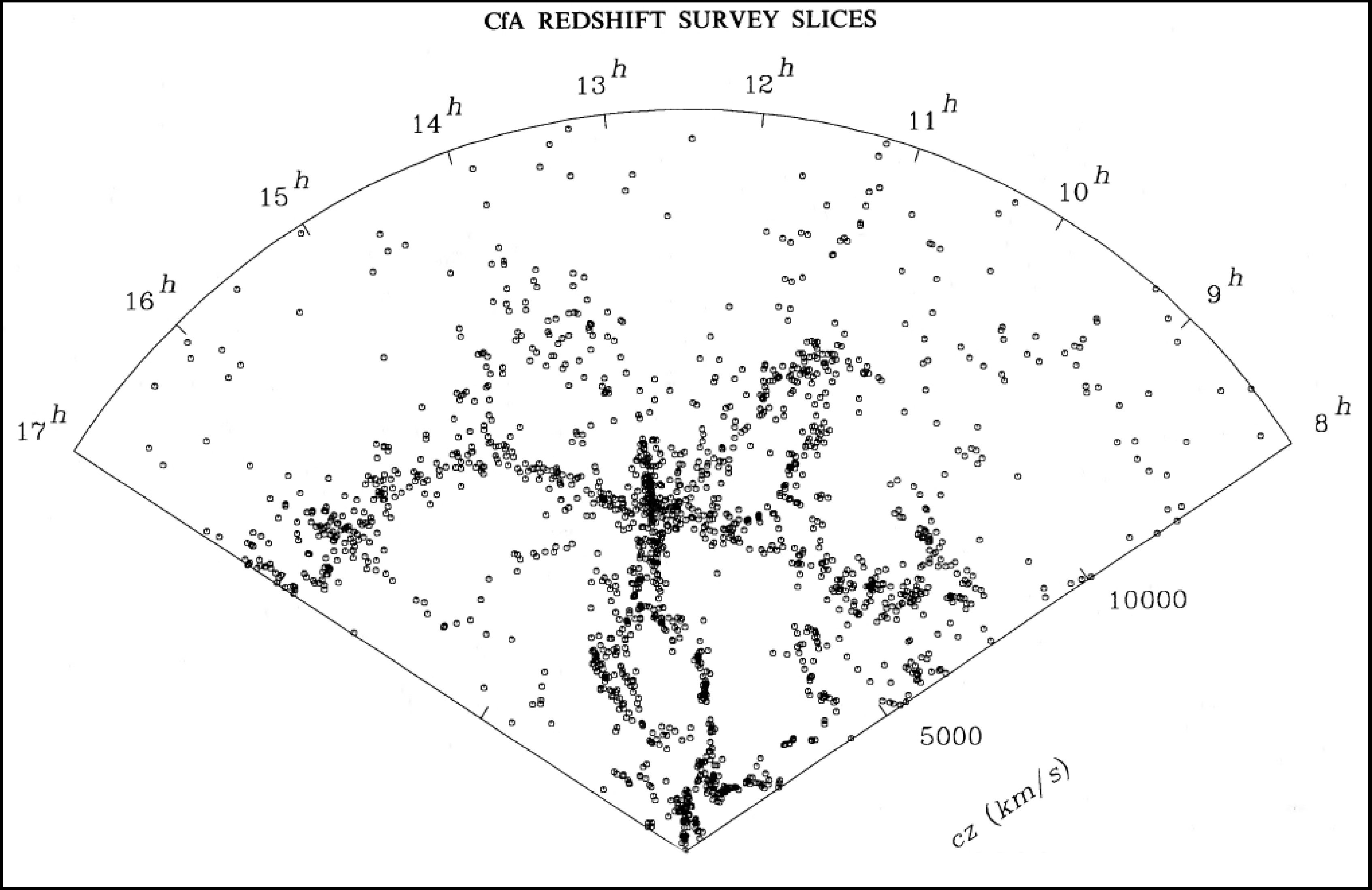
CfA REDSHIFT SURVEY SLICES
13 h
12 h
14 h
11 h
15 h
10 h
16 h
9 h
17 h
8 h
10000
5000
cz (km/s)

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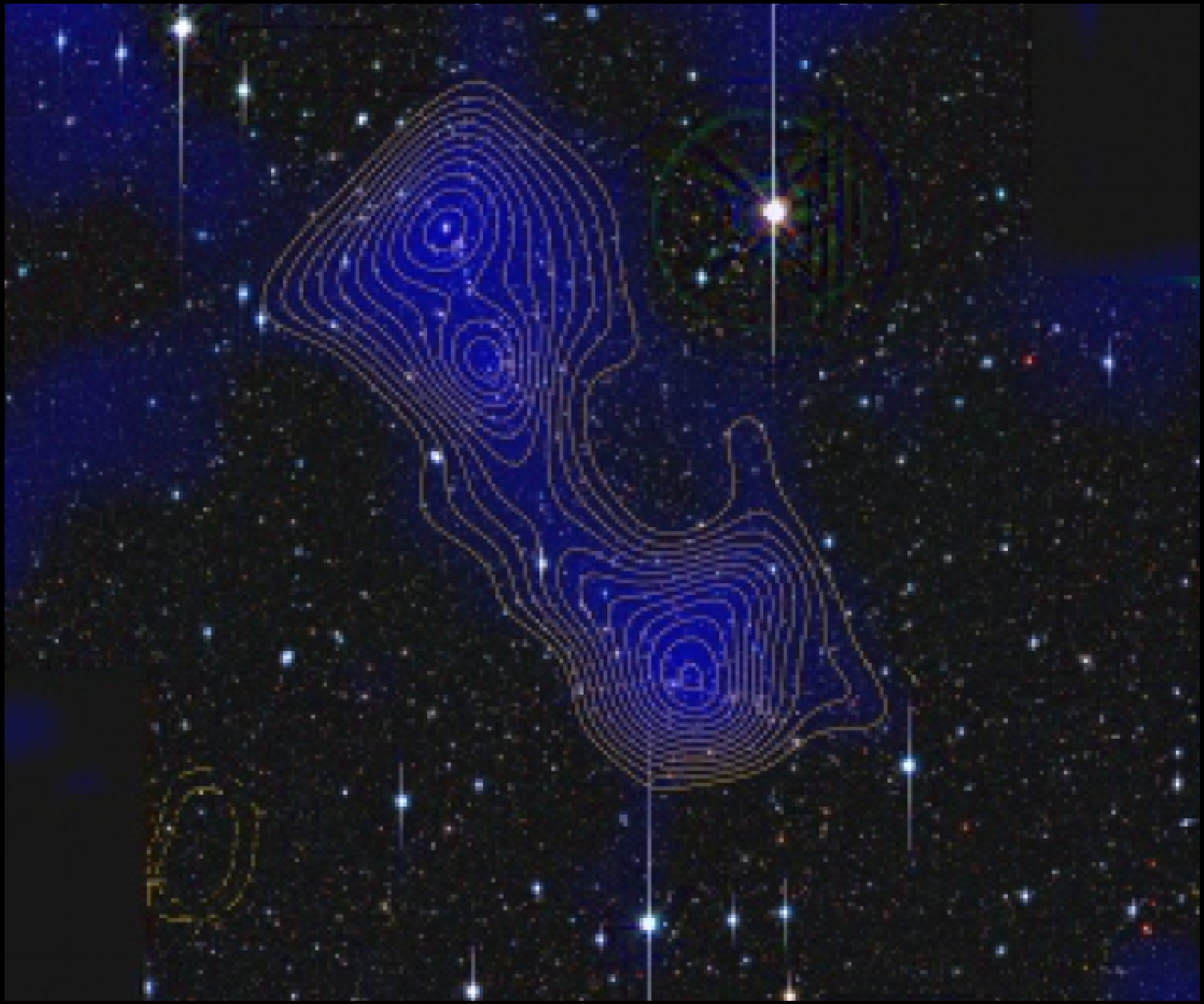
The hot gas, which appears to lie like a fog in channels carved by rivers of gravity, has been hidden from view since the time galaxies formed. It is thought that this gas forms part of a web, of hot gas and dark matter that defines the cosmic landscape.

The hot gas part of this system could contain more material than all the stars in the universe. Ultraviolet telescopes had detected cooler components of the hot gas system, but most of it is now known to be detectable only with an extremely sensitive X-ray telescope.

There appears to be a filament in which the Milky Way and Andromeda galaxies are embedded, whereas other detected portions are at distances of a few billion light years from Earth.

Merali 2012 – Detection by weak lensing



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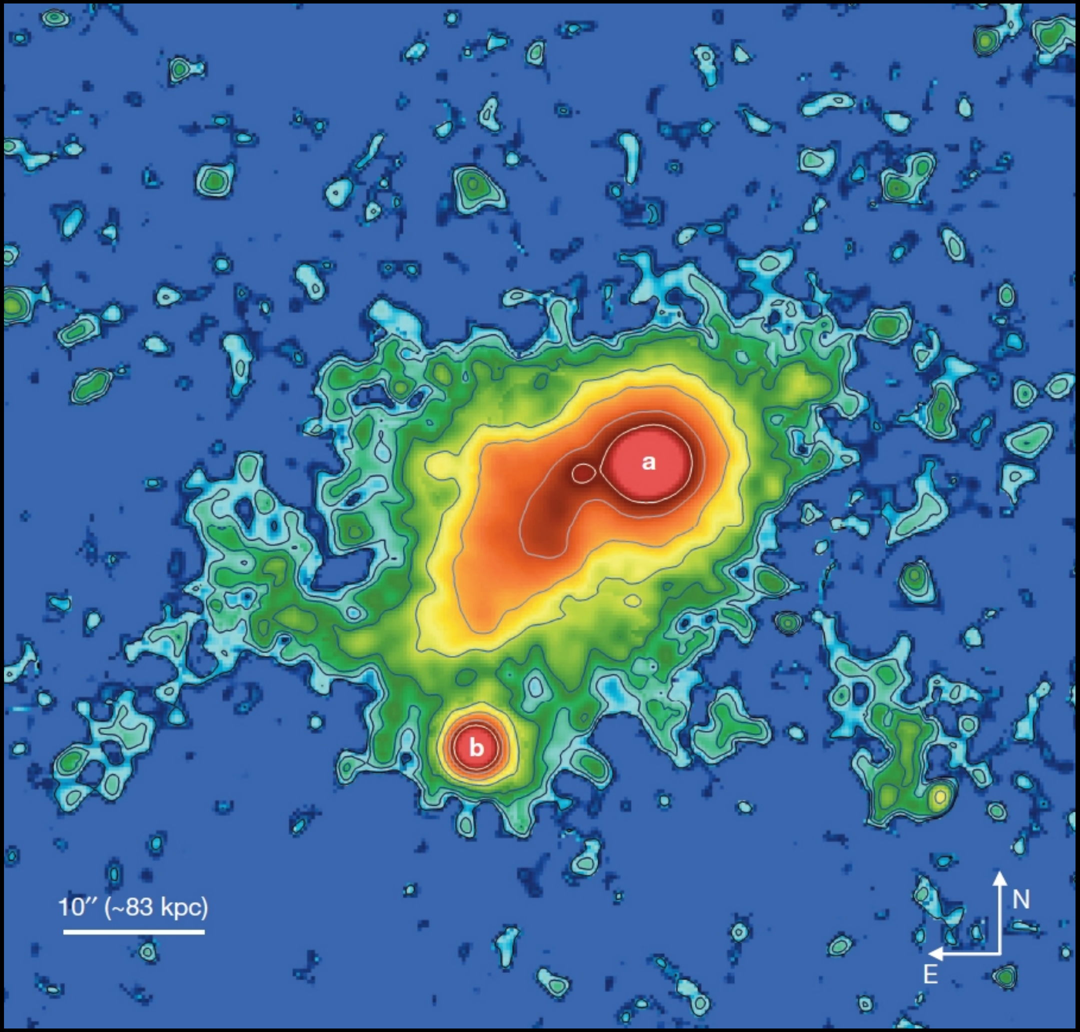

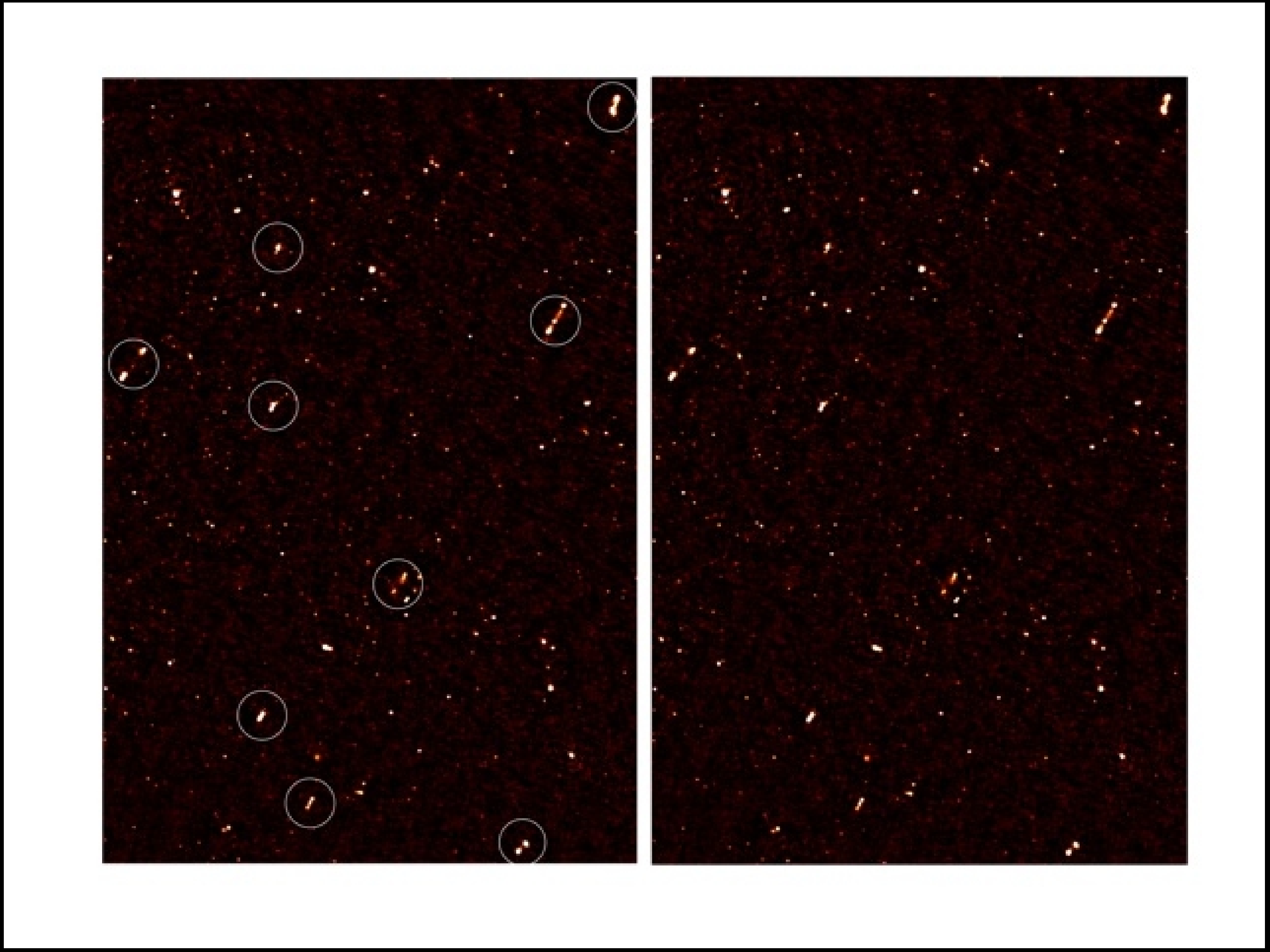

The image contains 65 resolved radio galaxy jets. The spatial distribution reveals a prominent alignment of jet position angles along a ‘filament’ of about 1 degree. Taylor 2016 (UCT)

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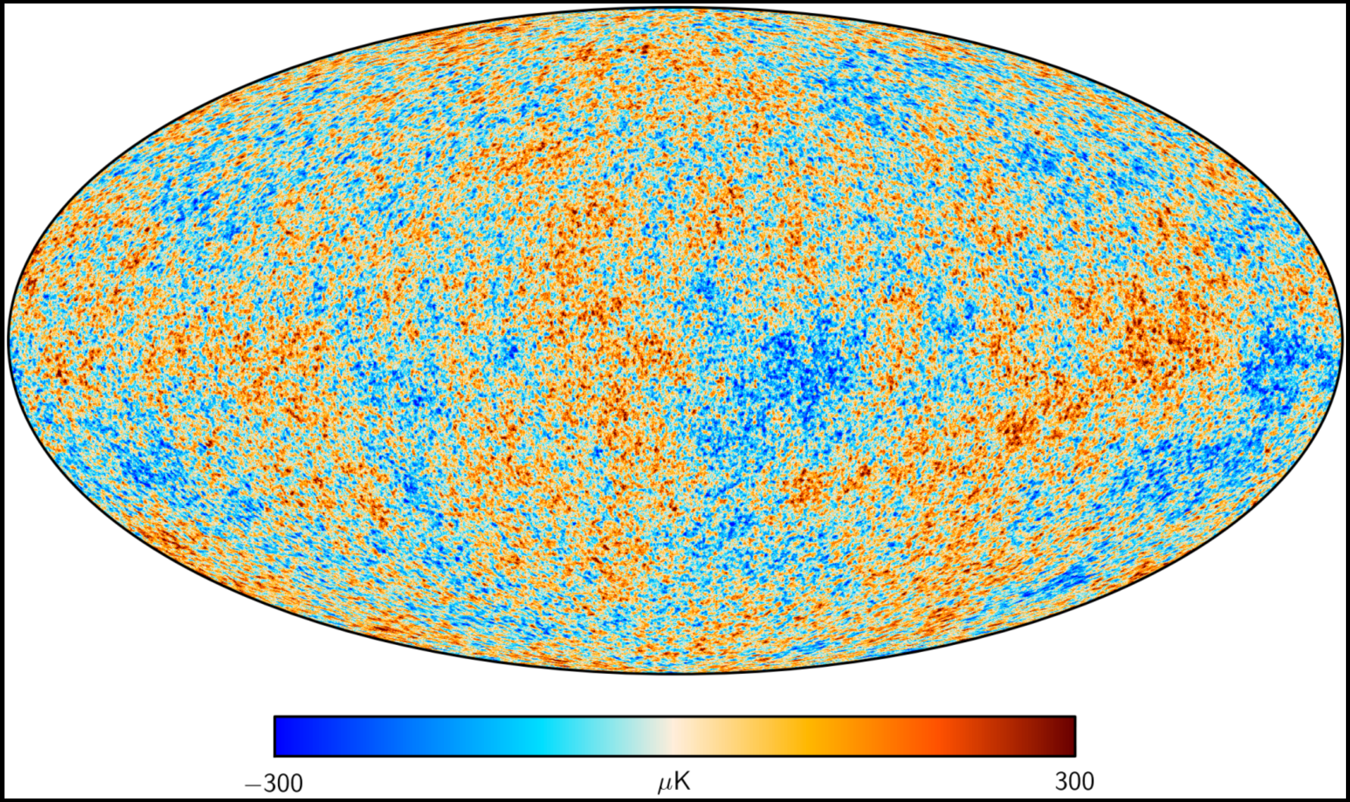

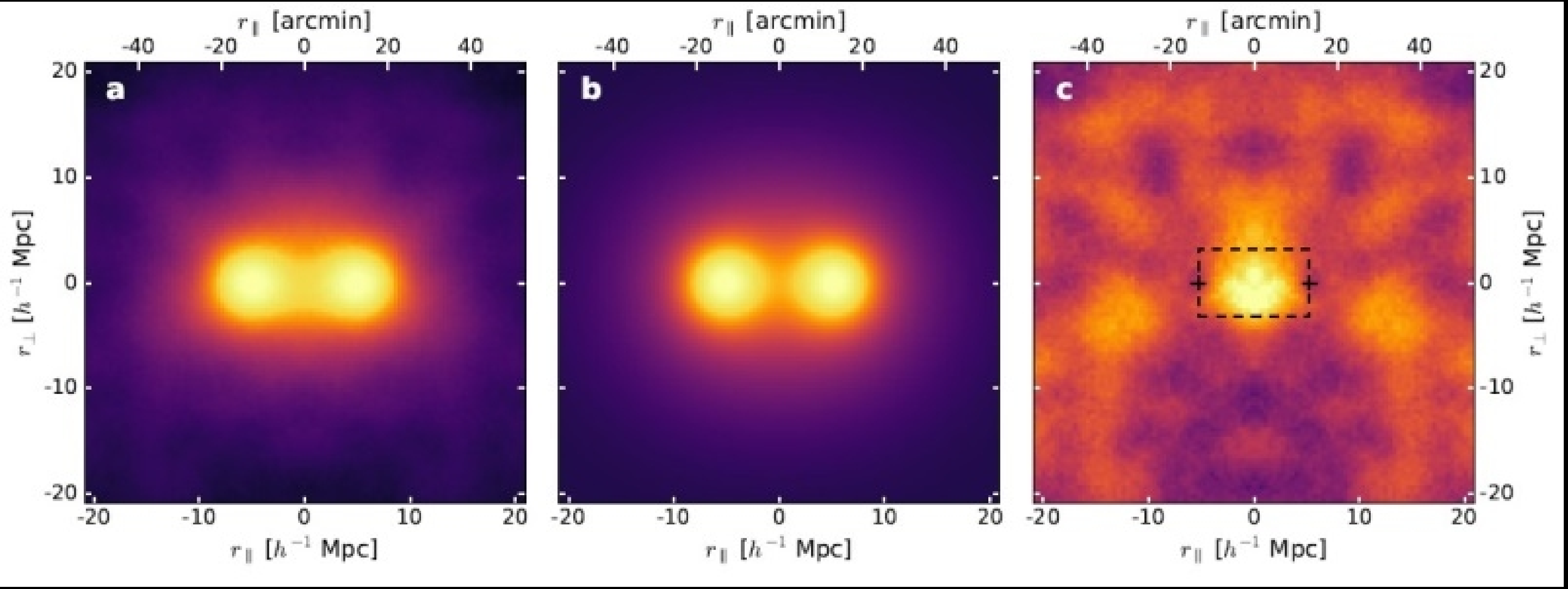

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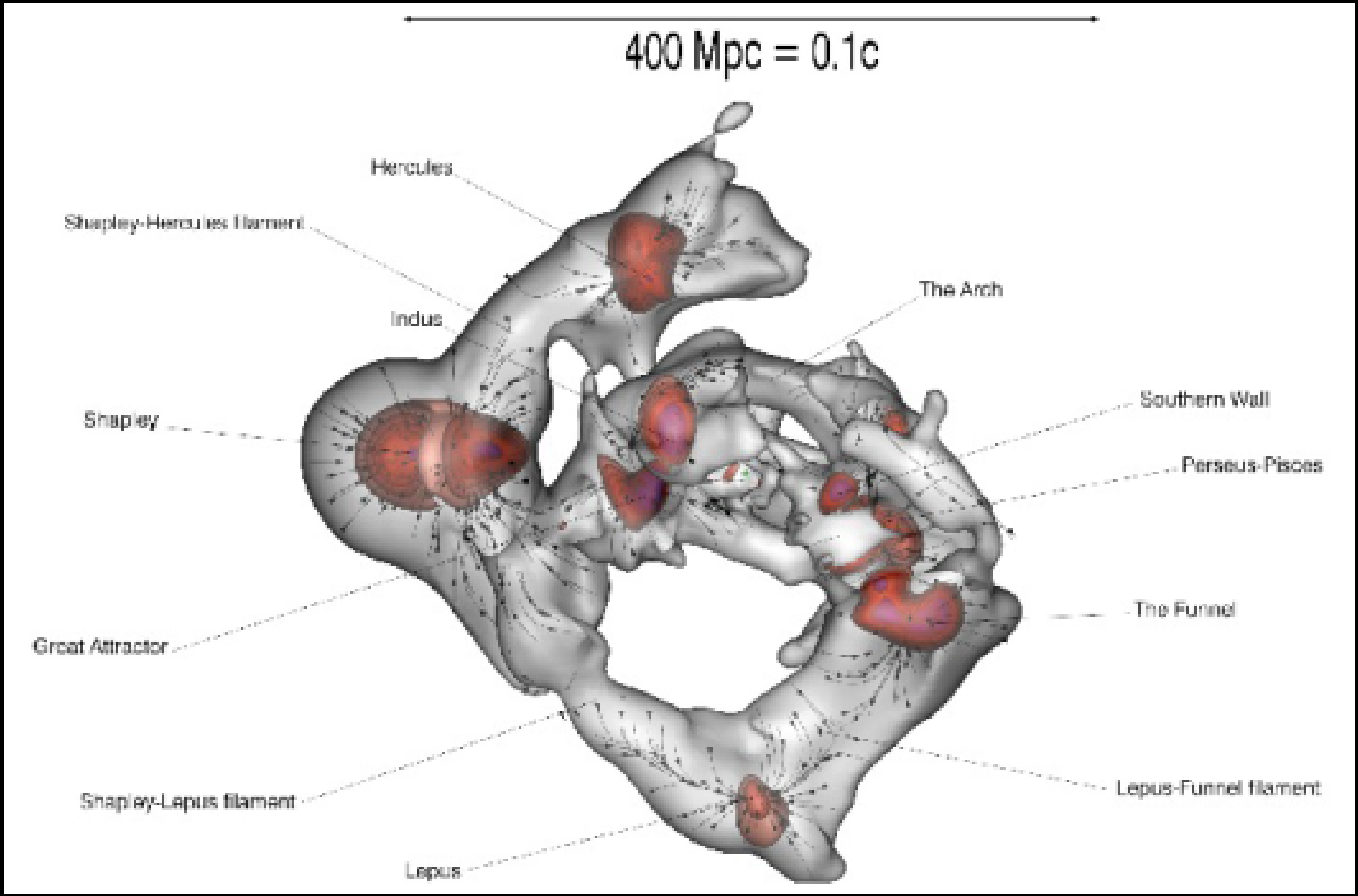

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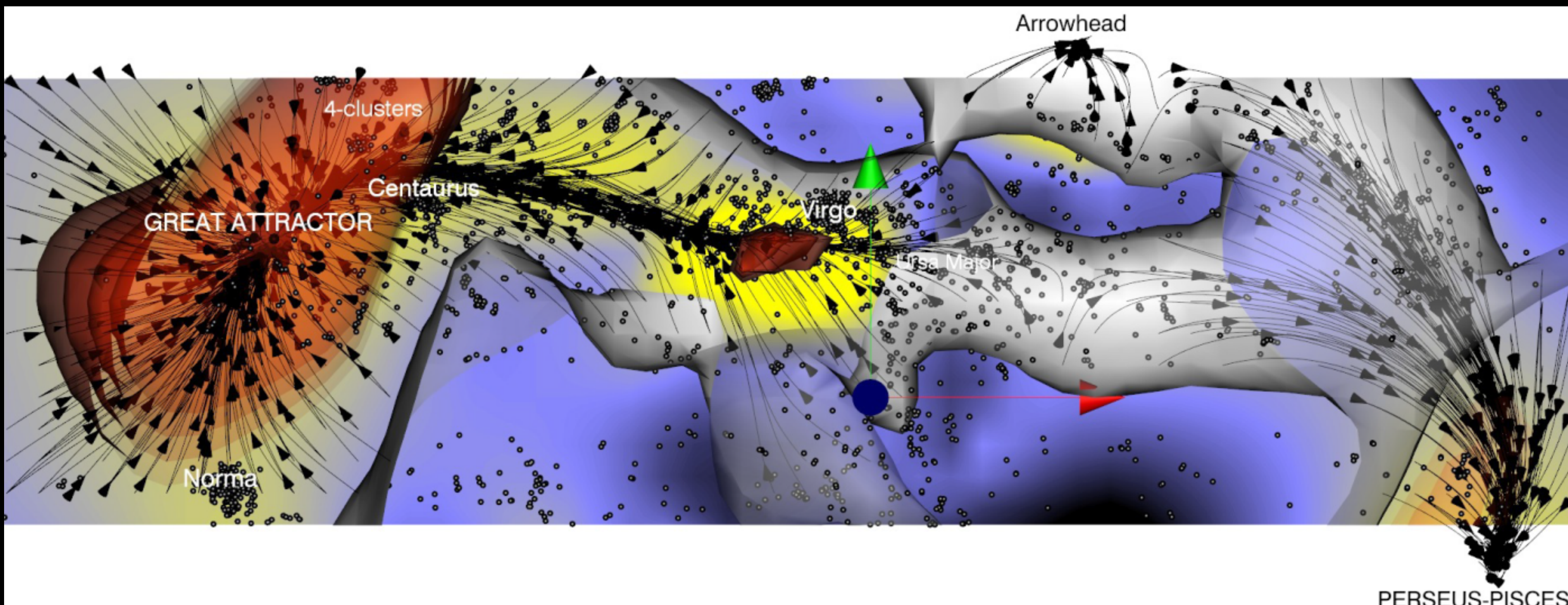

Arrowhead
4-clusters
Centaurus
GREAT ATTRACTOR
Virgo
Ursa Major
Norma
PERSEUS-PISCES

[redacted]

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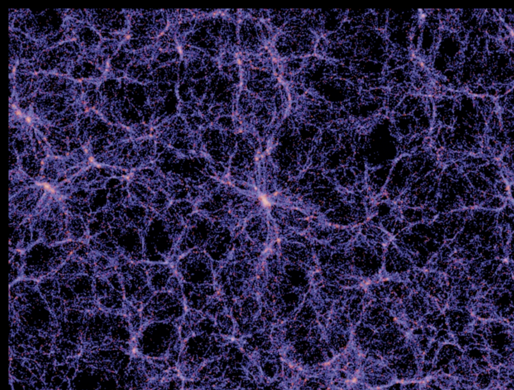

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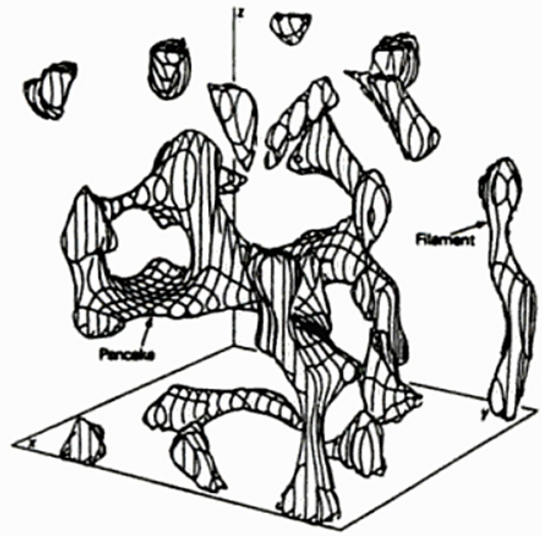
NATURE VOL. 305 15 SEPTEMBER 1983 LETTERS



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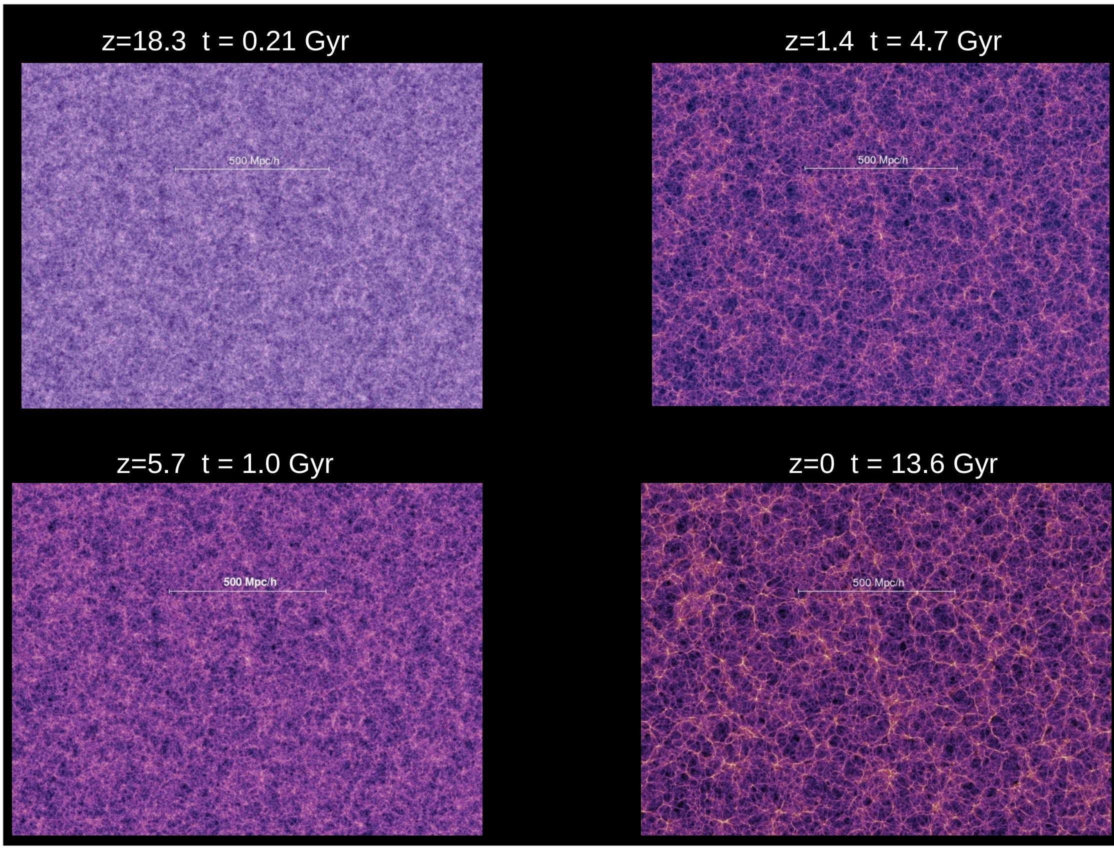
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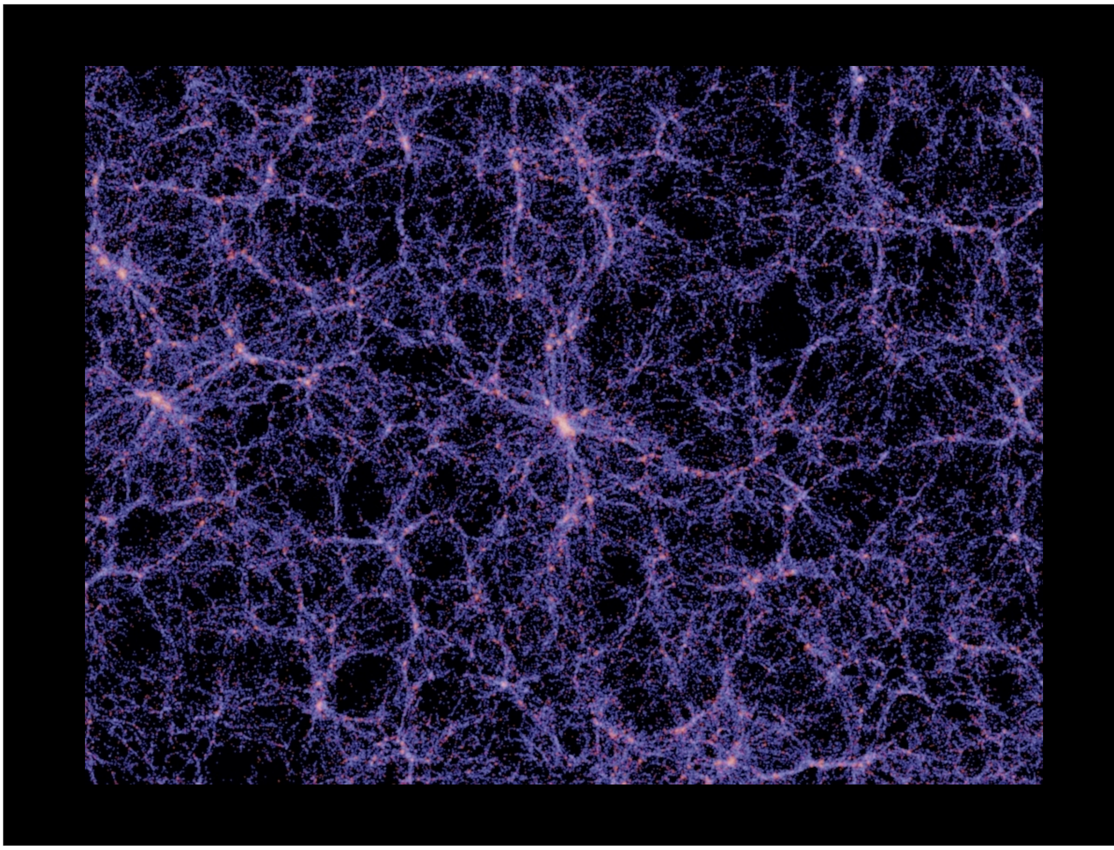

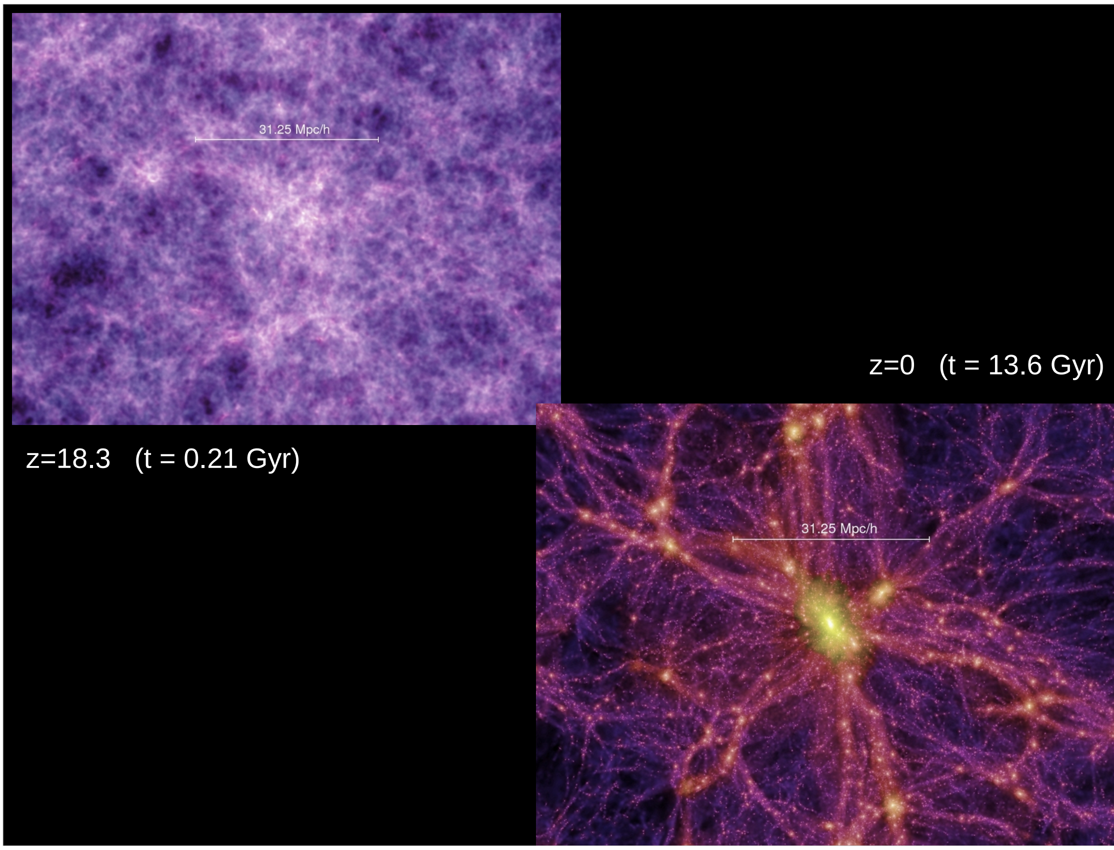
31.25 Mpc/h
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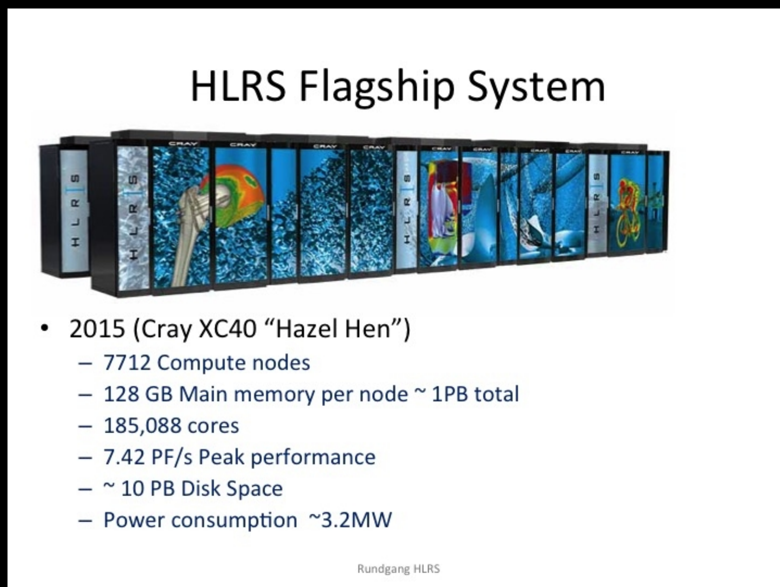
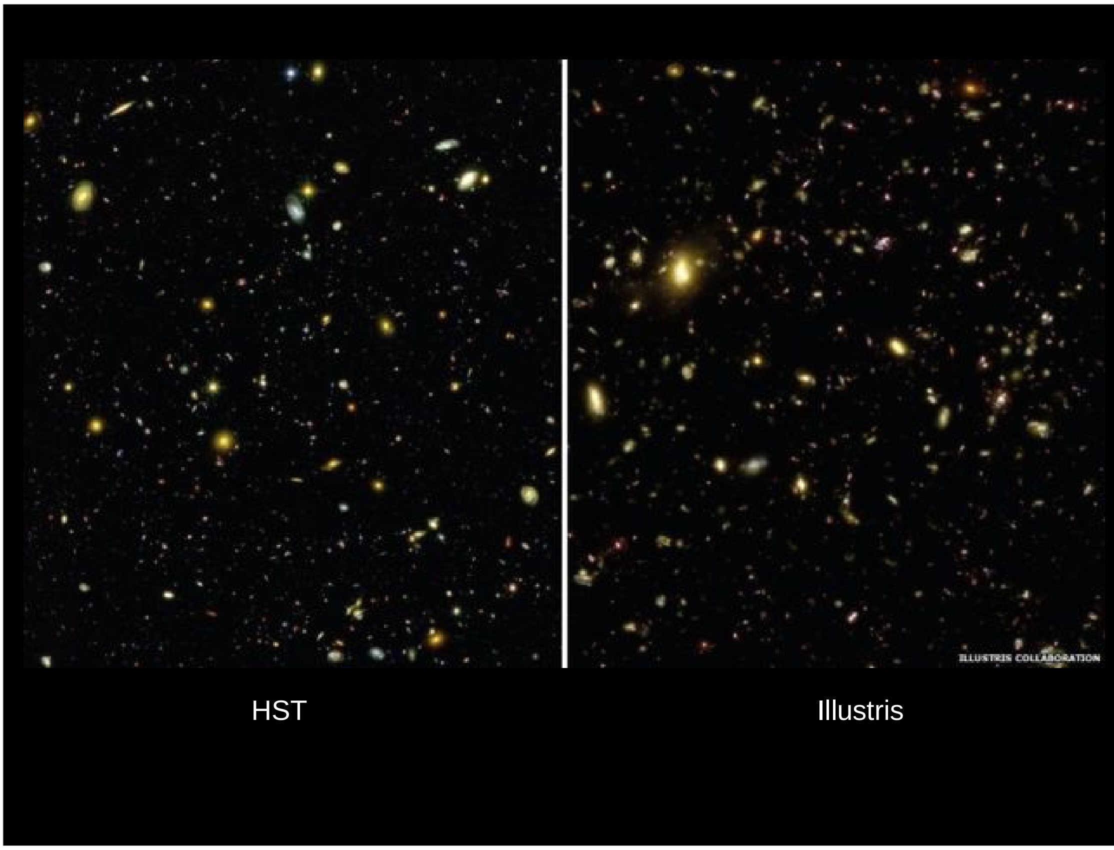
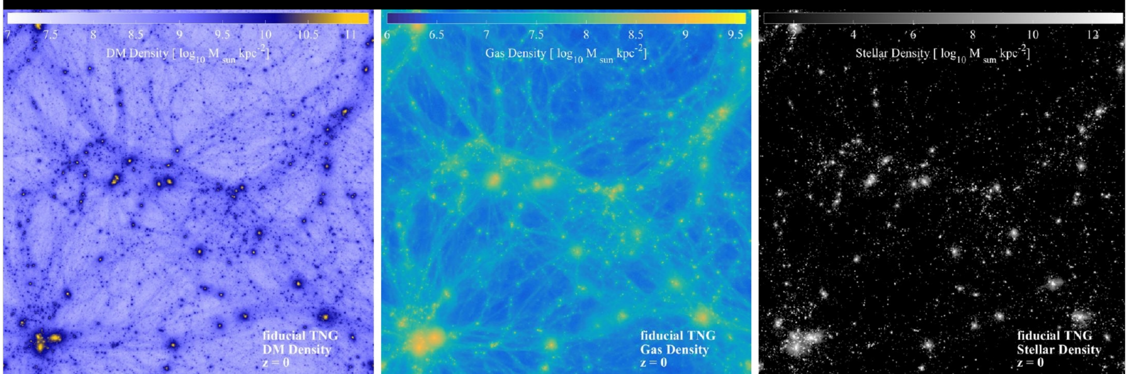




ILLUSTRIS COLLABORATION
HST
Illustris

IllustrisTNG   2107



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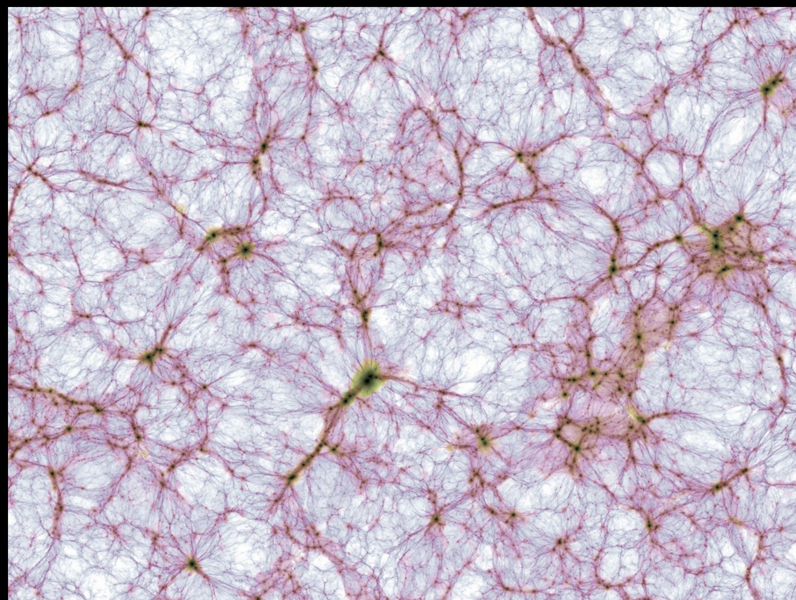

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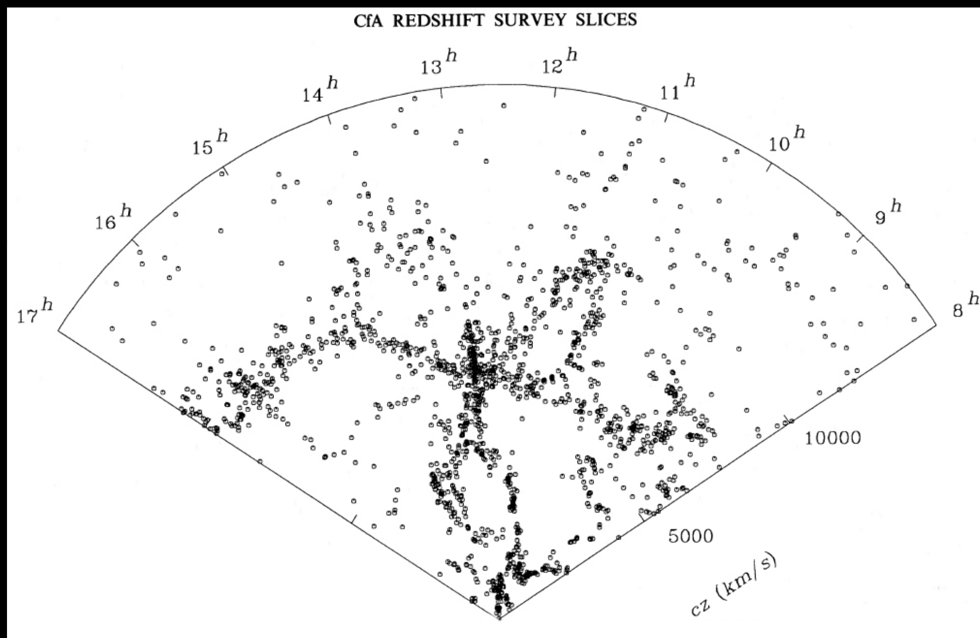
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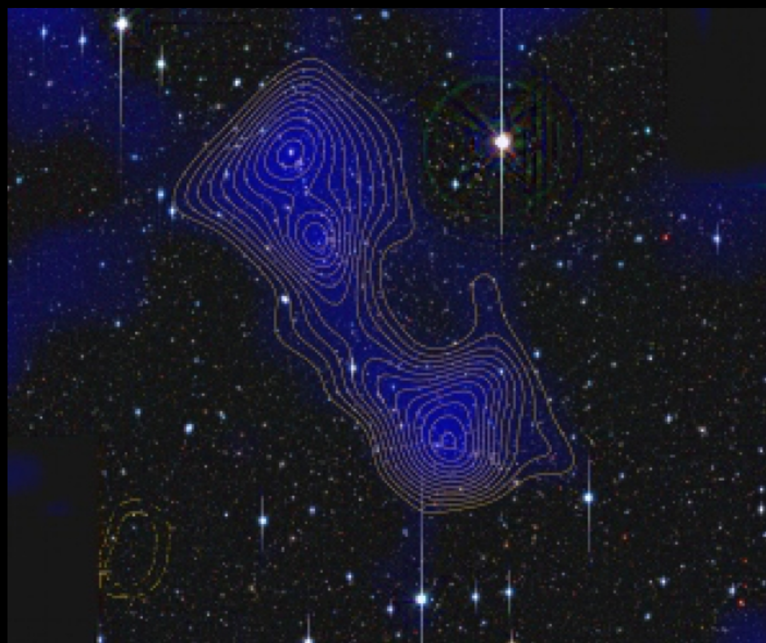

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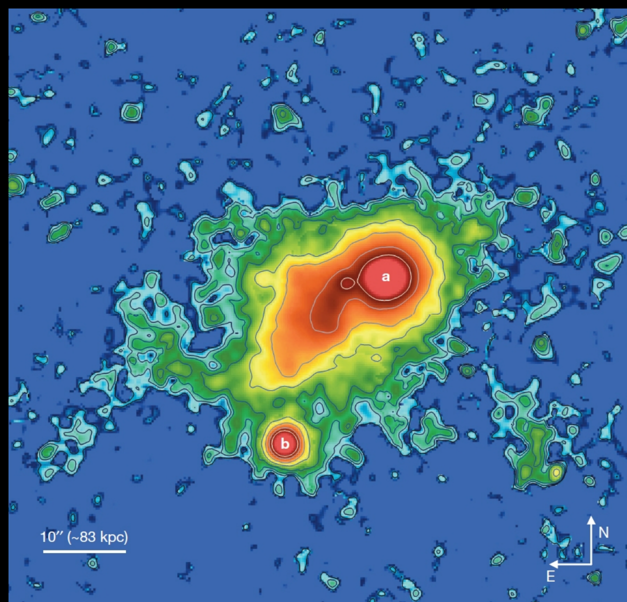

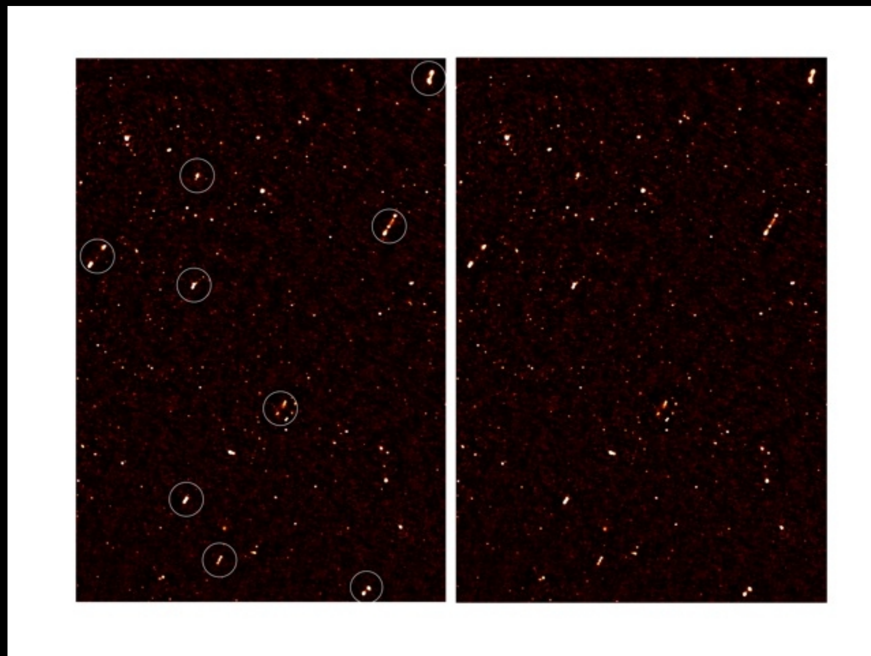

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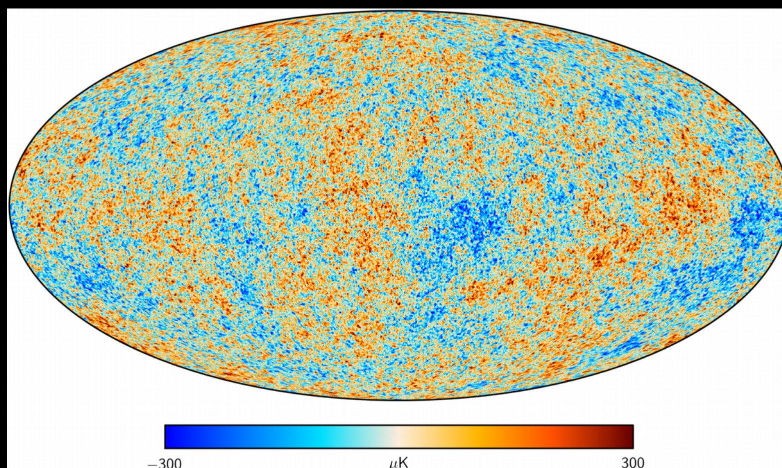

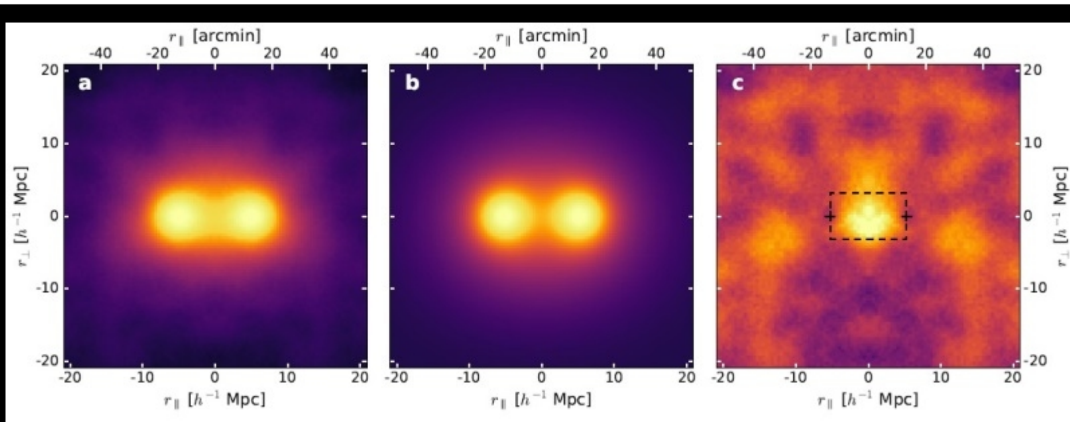

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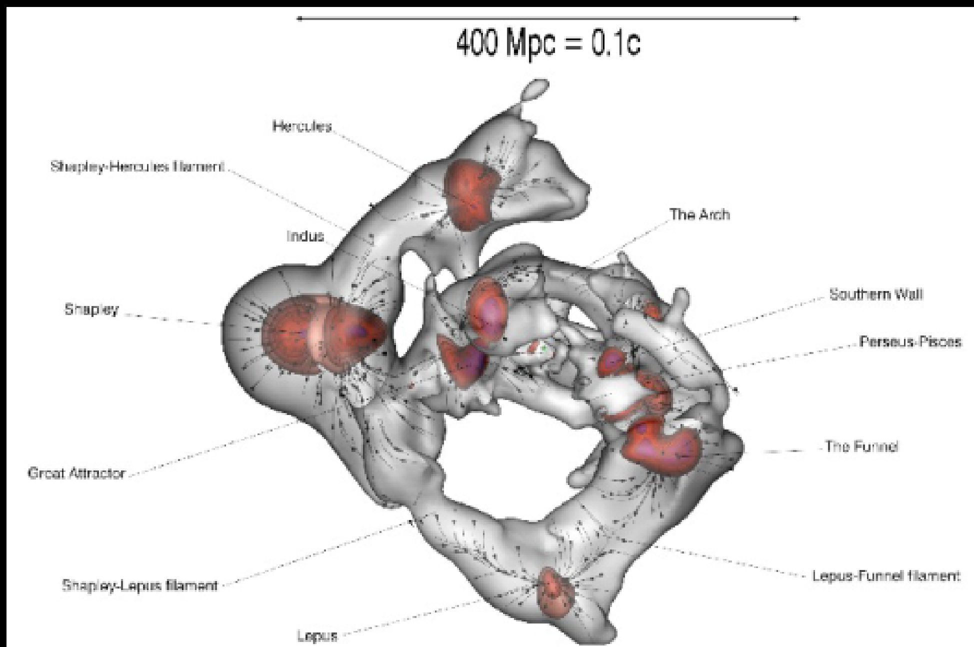

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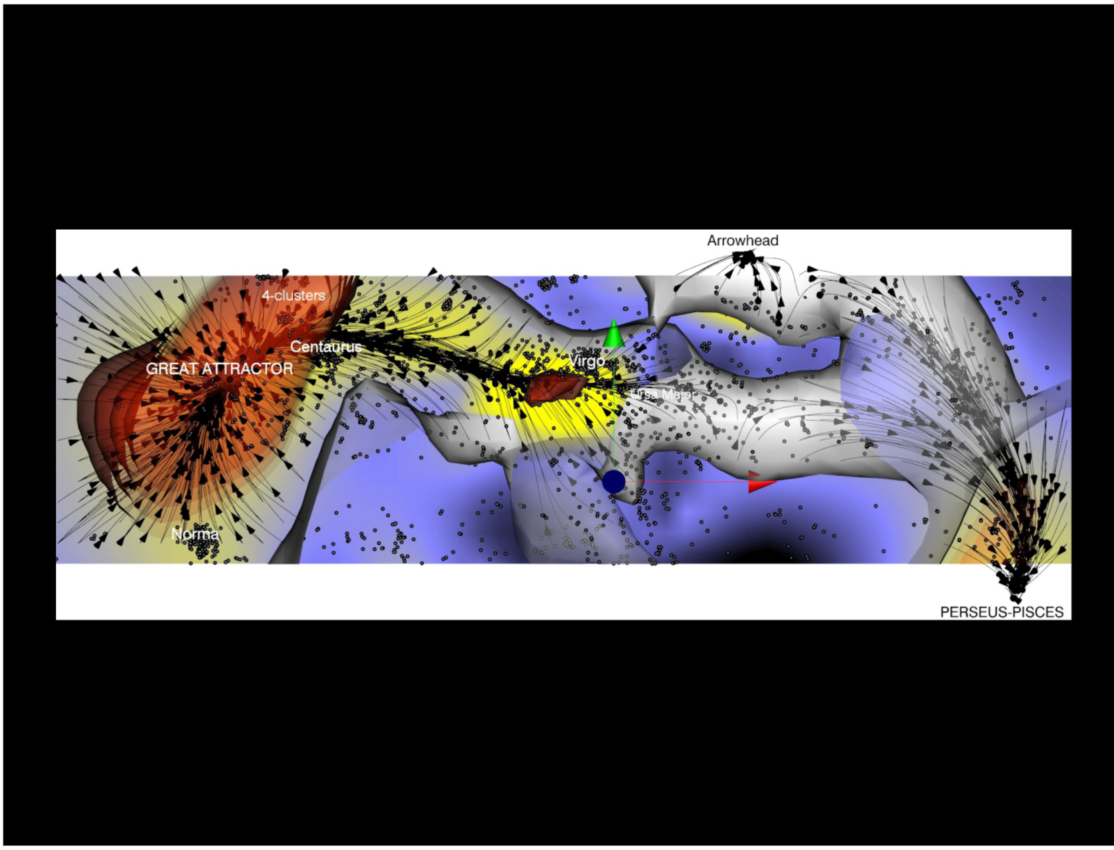

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4-clusters
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