

A Brief History of Everything

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SMU Quarknet

July 14 2026

Cosmology:

noun

The professional skill or practice of
beautifying the face, hair, and skin.

Cosmetology:

noun

The professional skill or practice of beautifying the face, hair, and skin.

Cosmetology:

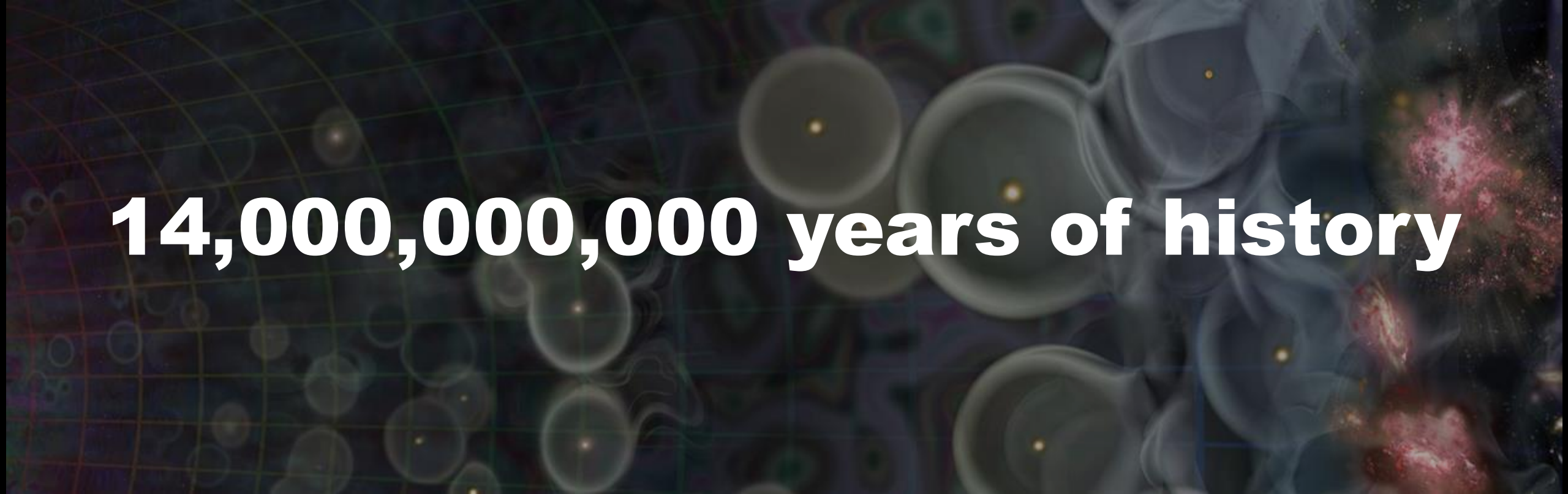
noun

The professional skill or practice of beautifying the face, hair, and skin.

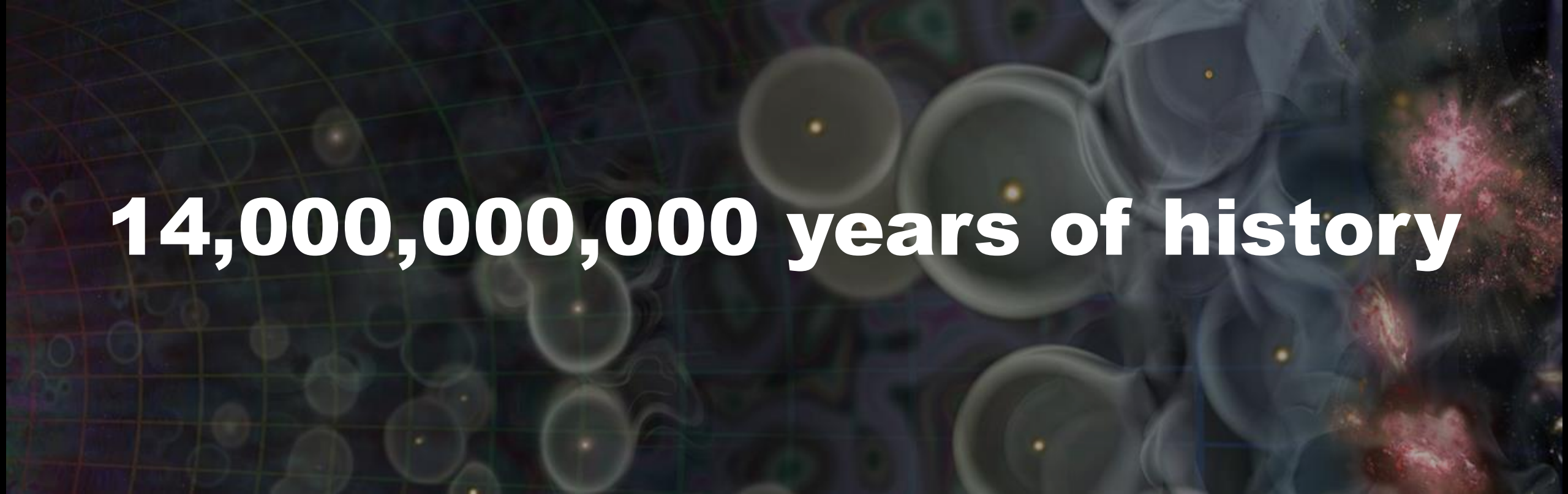
Cosmology:

noun

A branch of astronomy that deals with the origin and structure of the universe

The background of the image is a deep space scene. It features a grid of thin, glowing green lines that curve across the frame, suggesting a coordinate system or spacetime curvature. Scattered throughout are numerous galaxies, some appearing as bright, colorful clouds of red and white, while others are more distant and faint. Several bright, yellowish-white points of light, likely stars or distant galaxies, are visible against the dark background.

14,000,000,000 years of history

A cosmic background image featuring a grid of green and blue lines over a dark space filled with various galaxies and nebulae. The text is overlaid on this background.

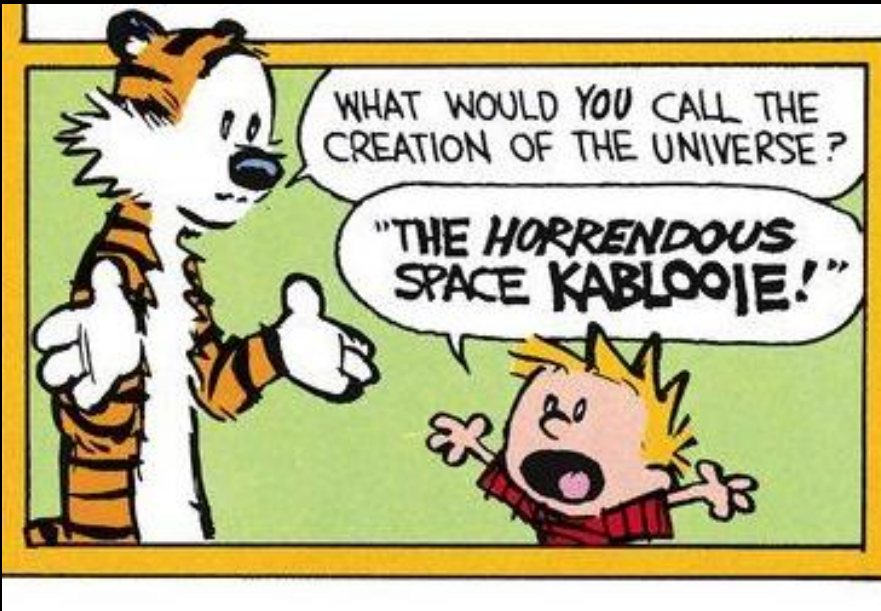
14,000,000,000 years of history

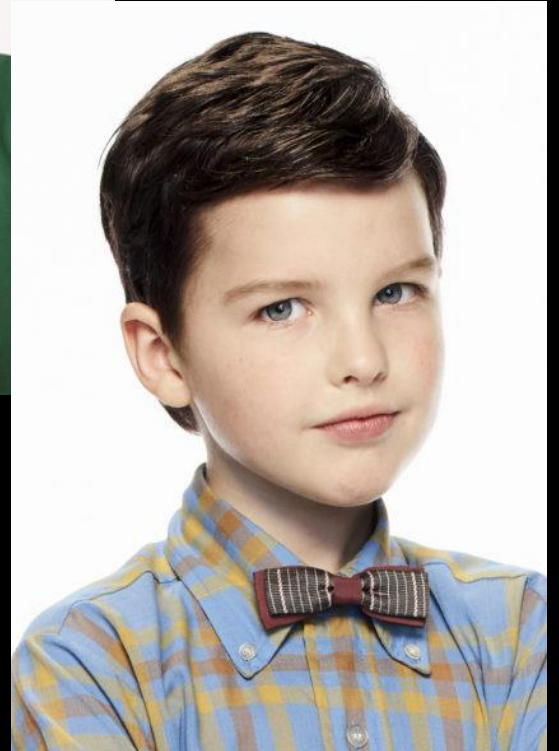
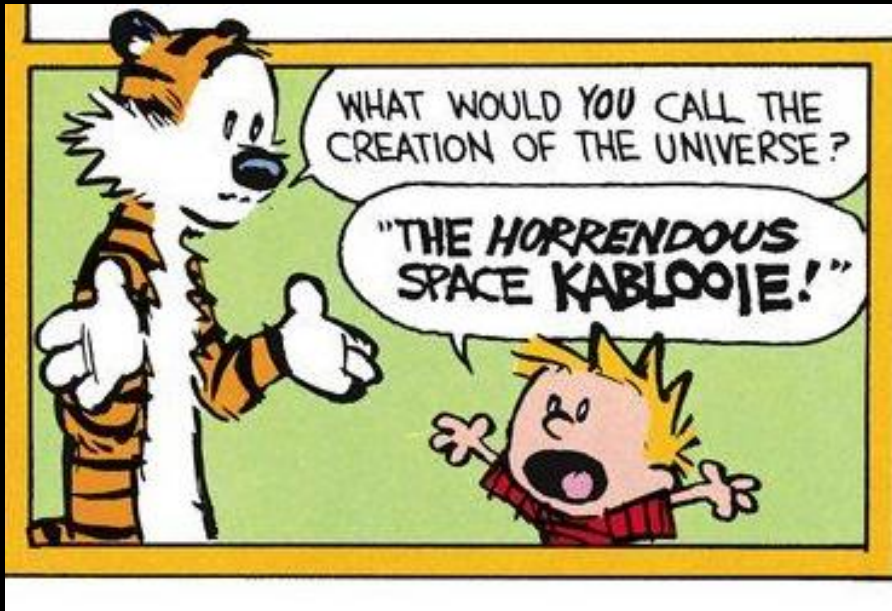
In 45ish minutes

In The Beginning...



the BIG
BANG
THEORY









Edwin Hubble



**Henrietta Swan
Leavitt**

The Universe

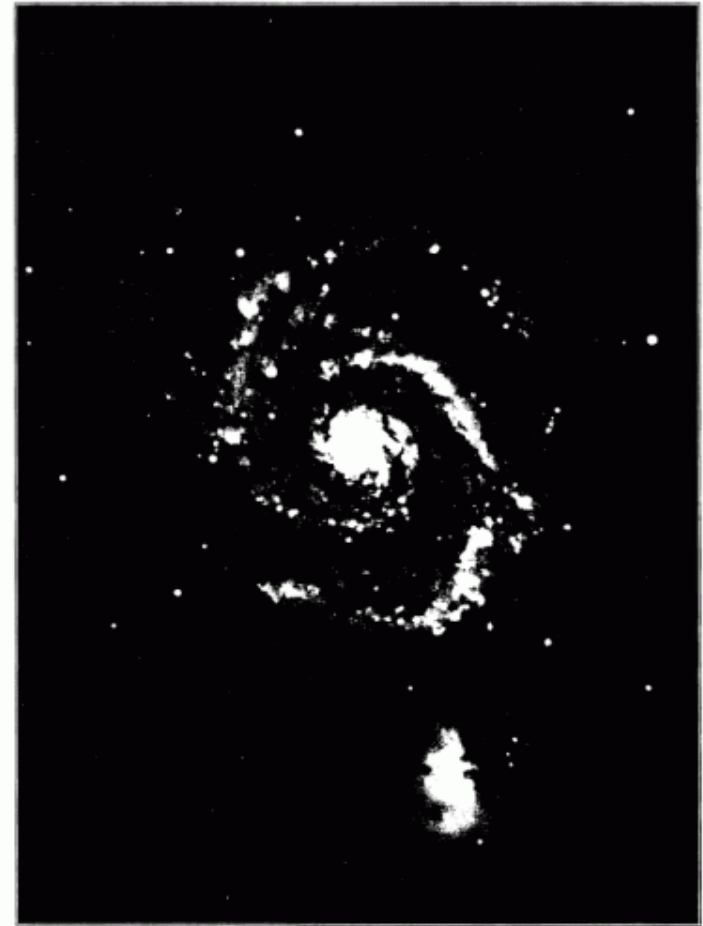


Circa ~1900

“Spiral Nebulae”

PLATE IV

South



SPIRAL NEBULA *Messier 51 Canum Venaticorum*

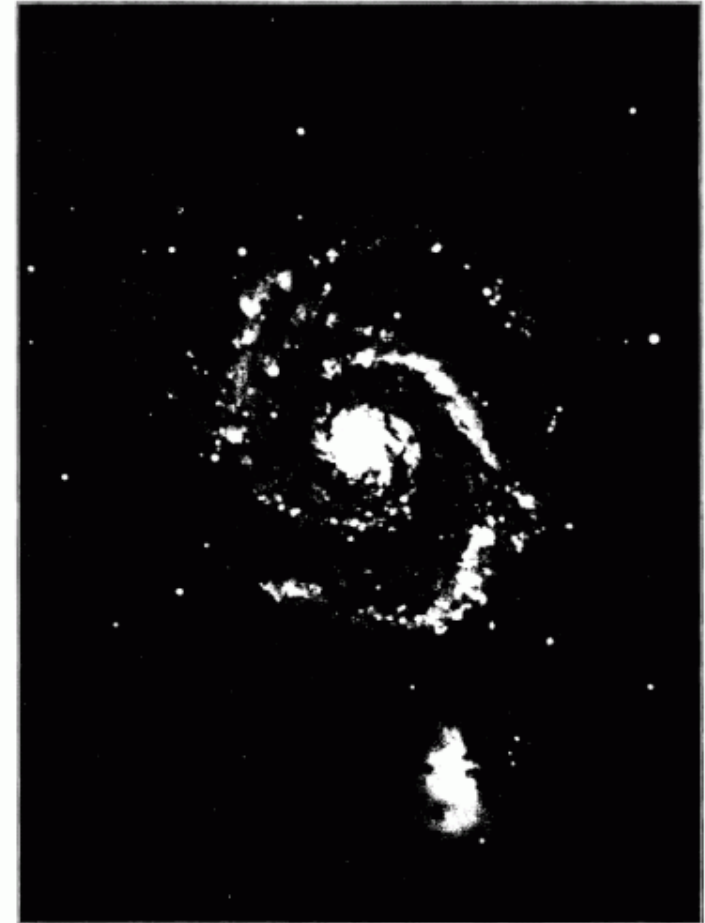
Photographed with 60-Inch Reflector on Seed 23 plate, February 7 and 8, 1910
Exposure $3^h 55^m$. Enlargement from negative 6.4 diameters. Scale: 1 mm = $4.7''$

“Spiral Nebulae”

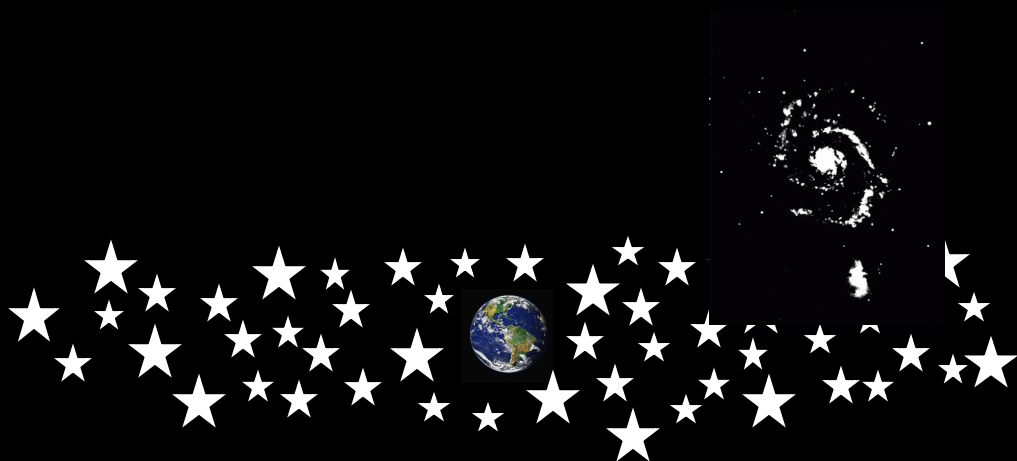
(Because “weird swirly thing”
doesn’t sound sciency enough)

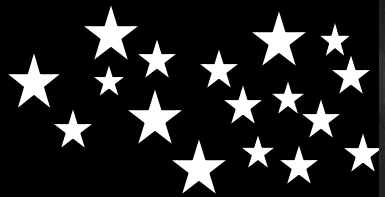
PLATE IV

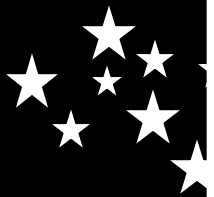
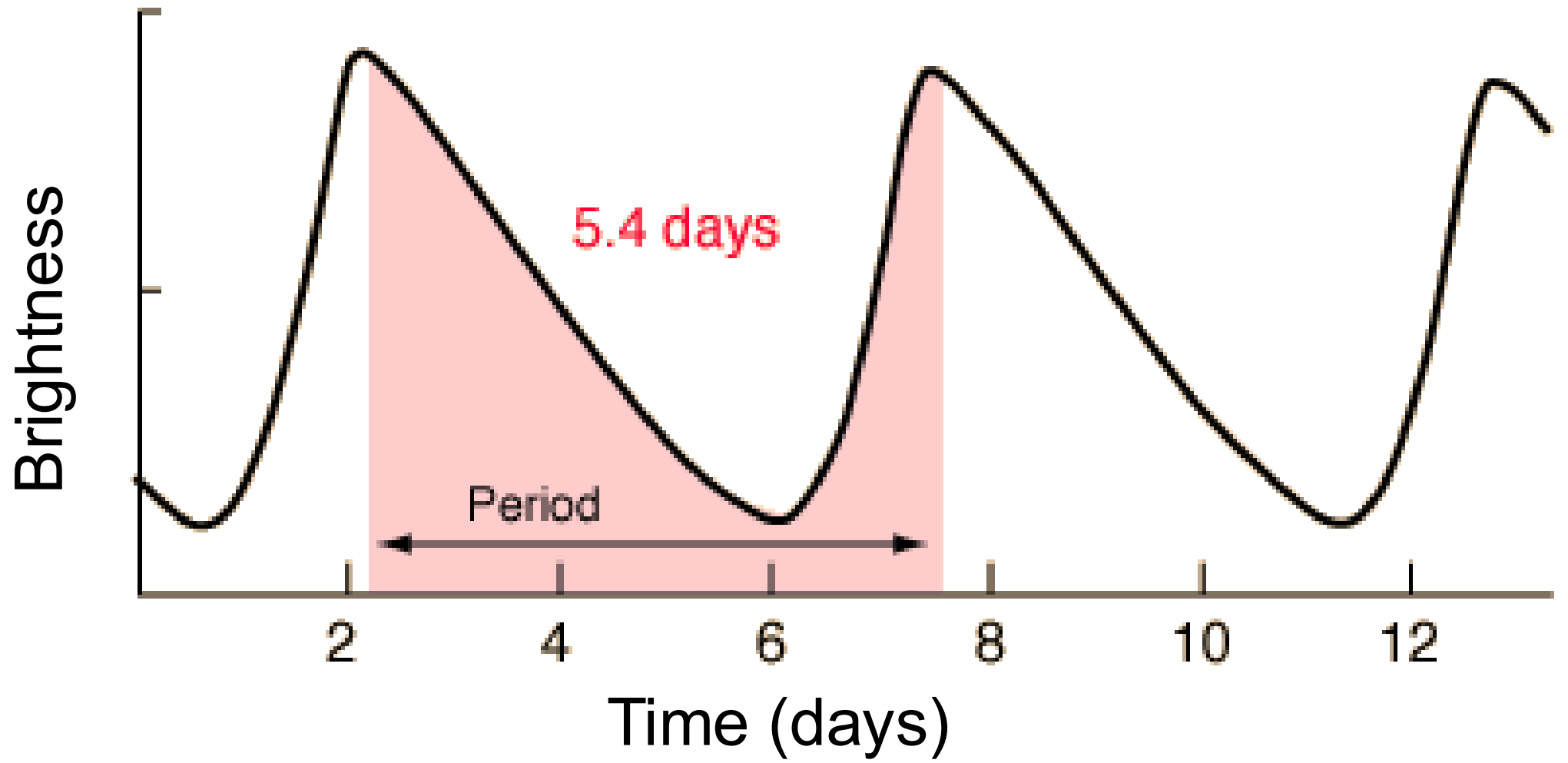
South



SPIRAL NEBULA *Messier 51 Canum Venaticorum*
Photographed with 60-Inch Reflector on Seed 23 plate, February 7 and 8, 1910
Exposure 3^h 55^m. Enlargement from negative 6.4 diameters. Scale: 1 mm = 4.72

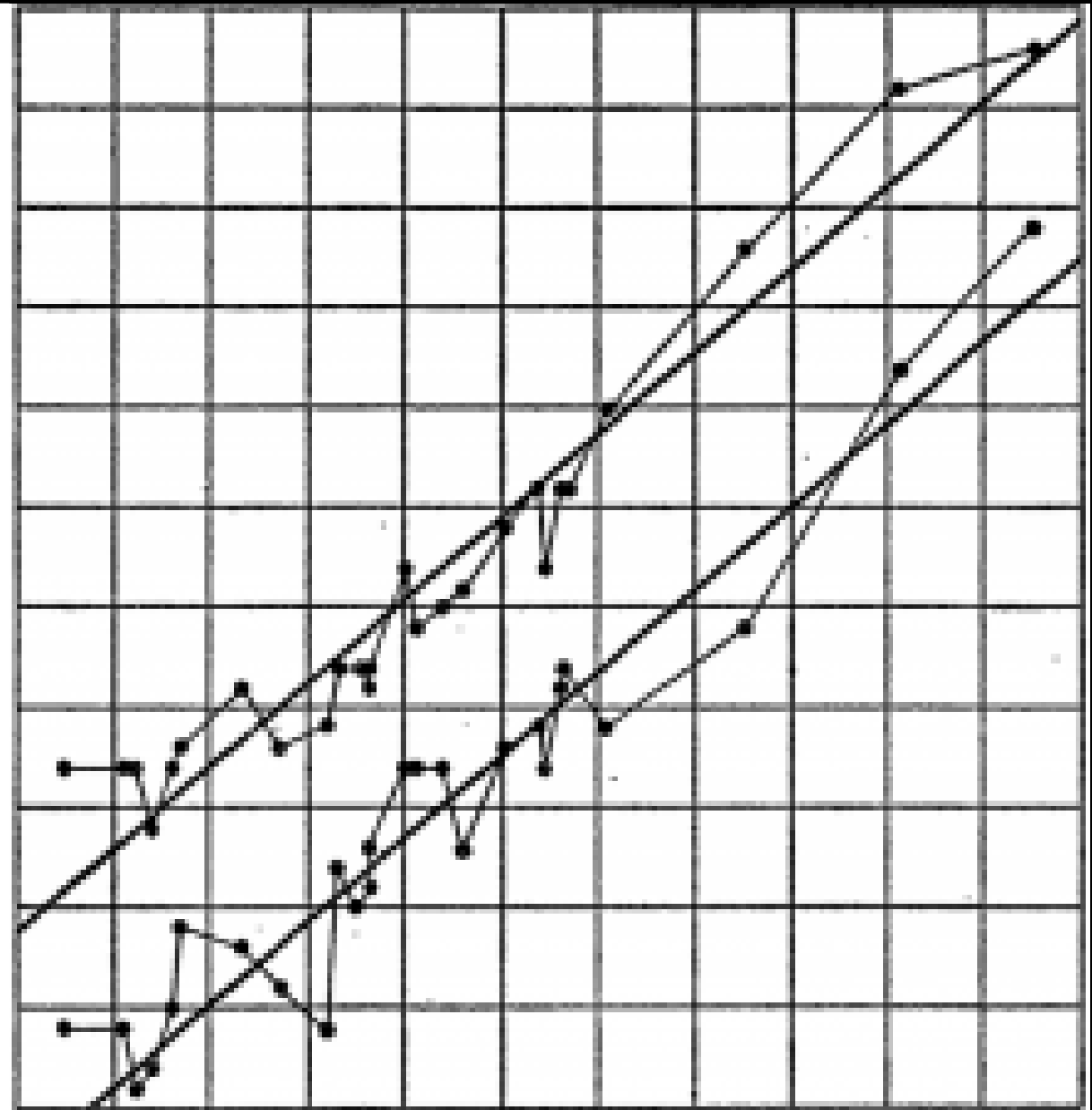




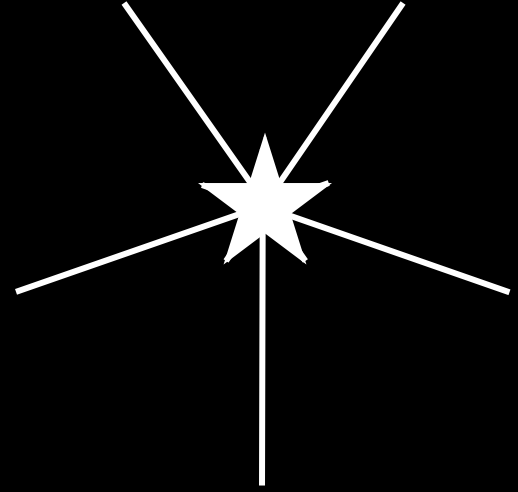


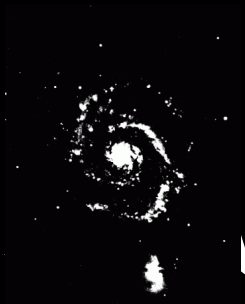


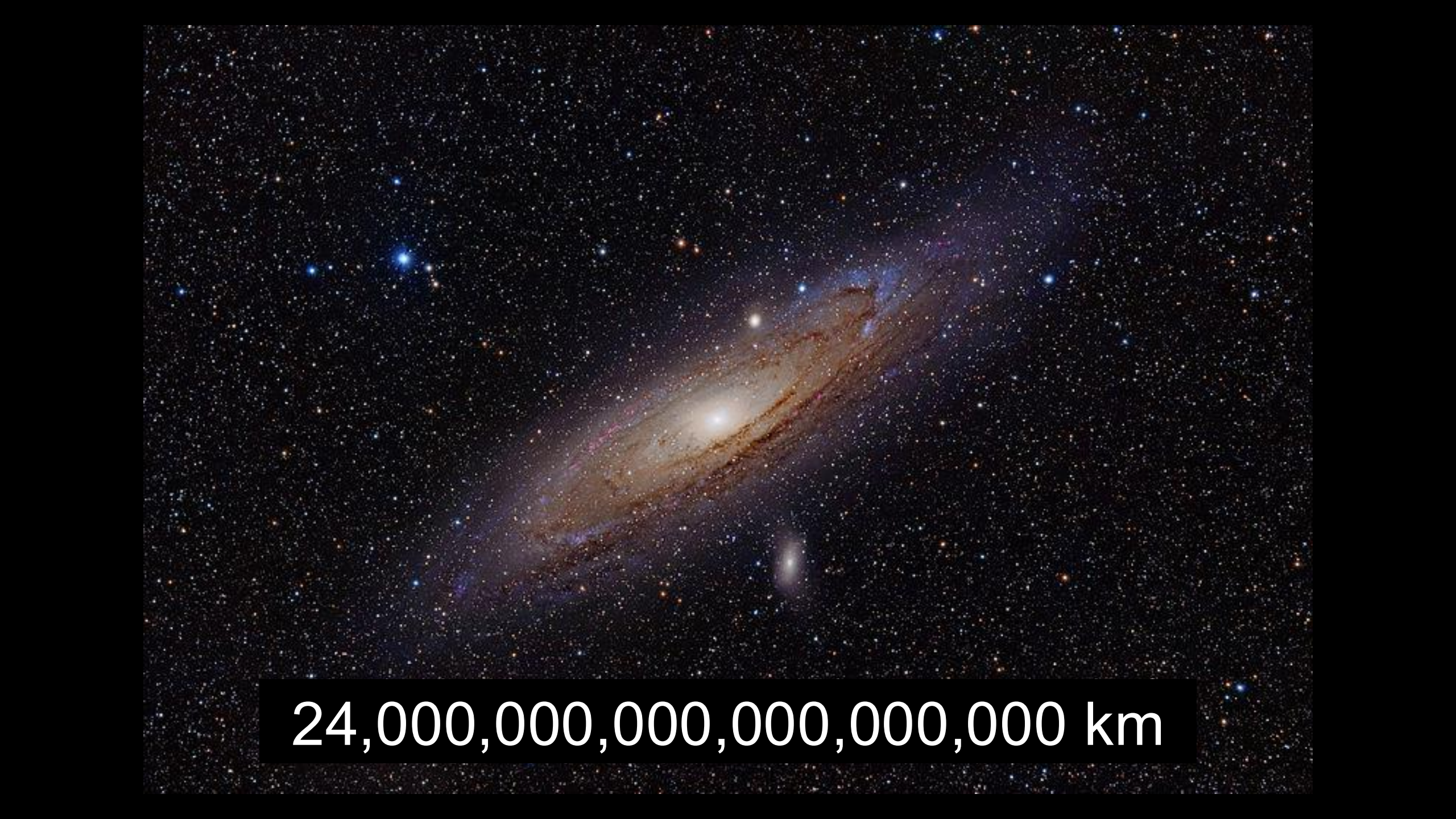
Brightness



Period





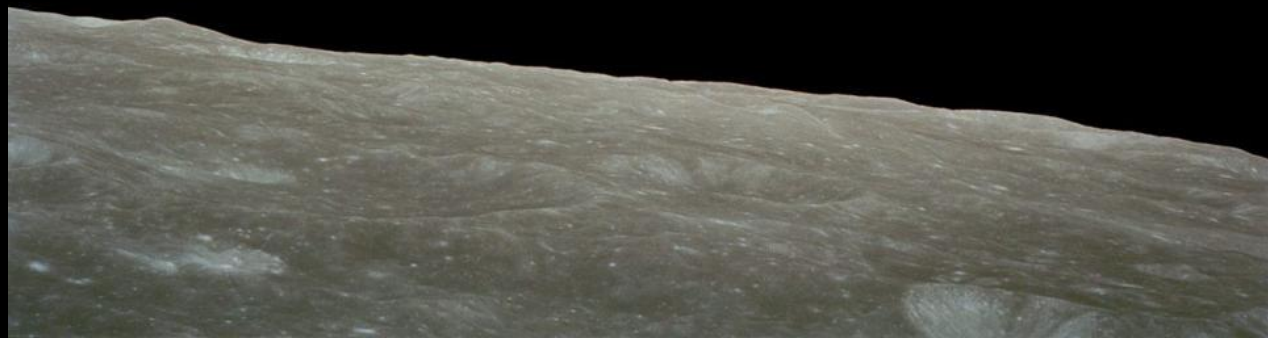


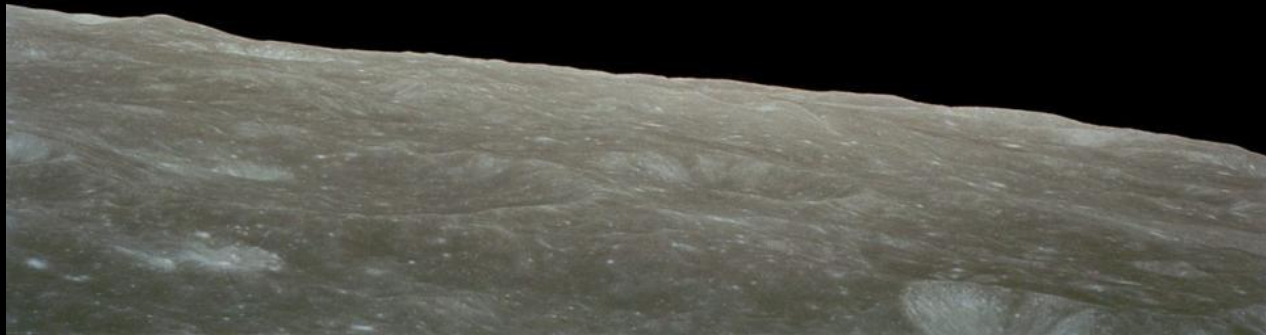
24,000,000,000,000,000,000 km

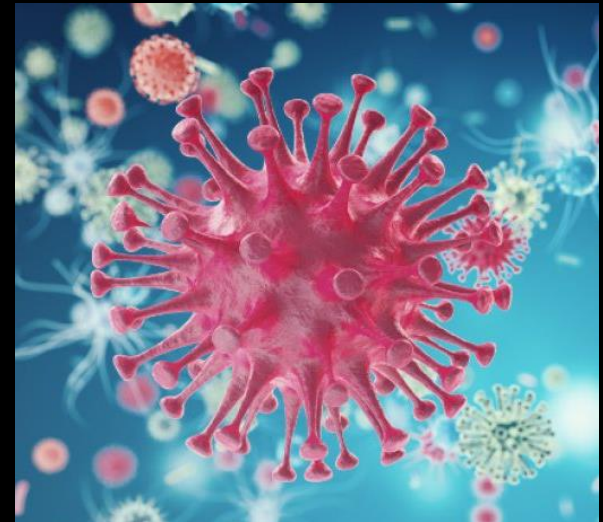
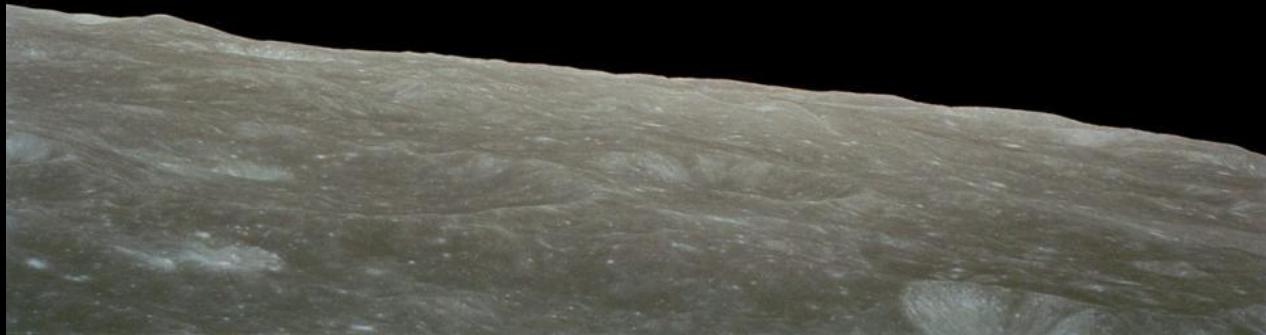




94,000,000,000 km







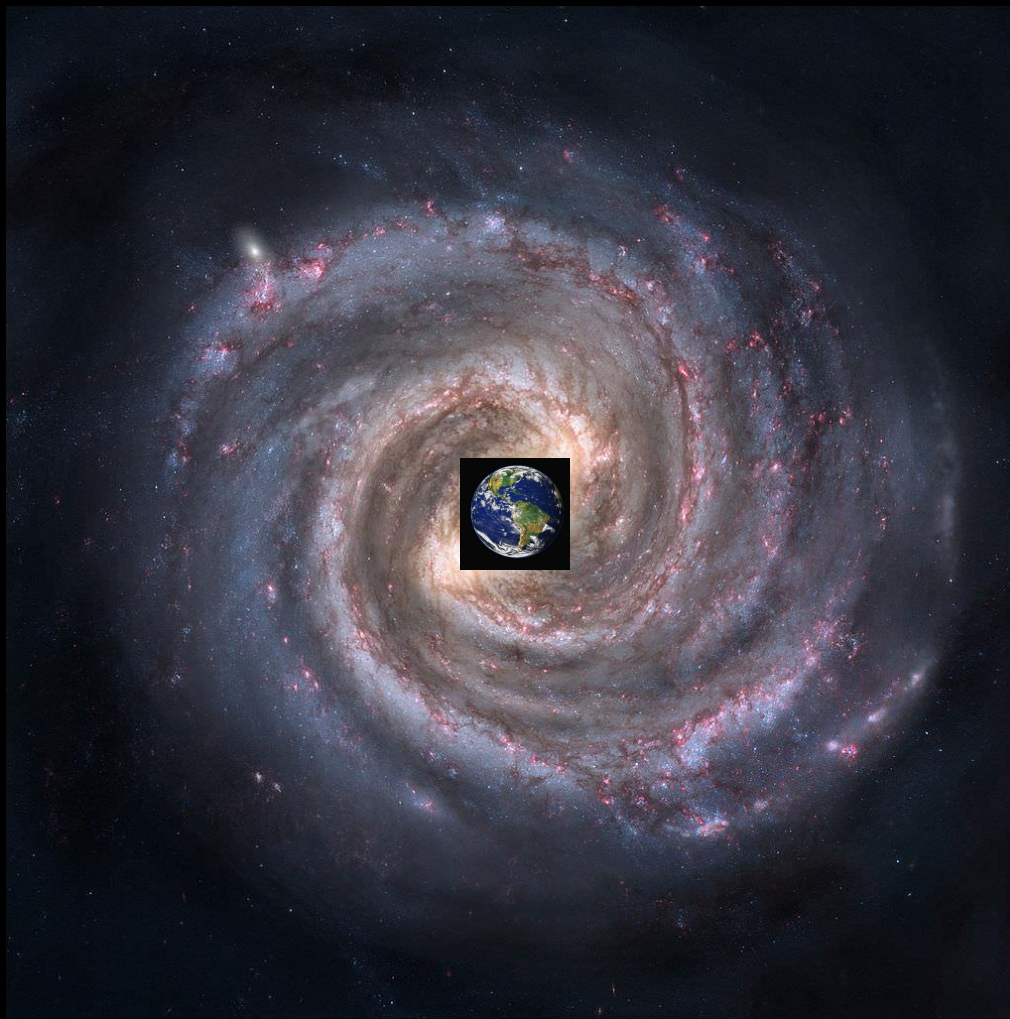




*Actual Size



1000000











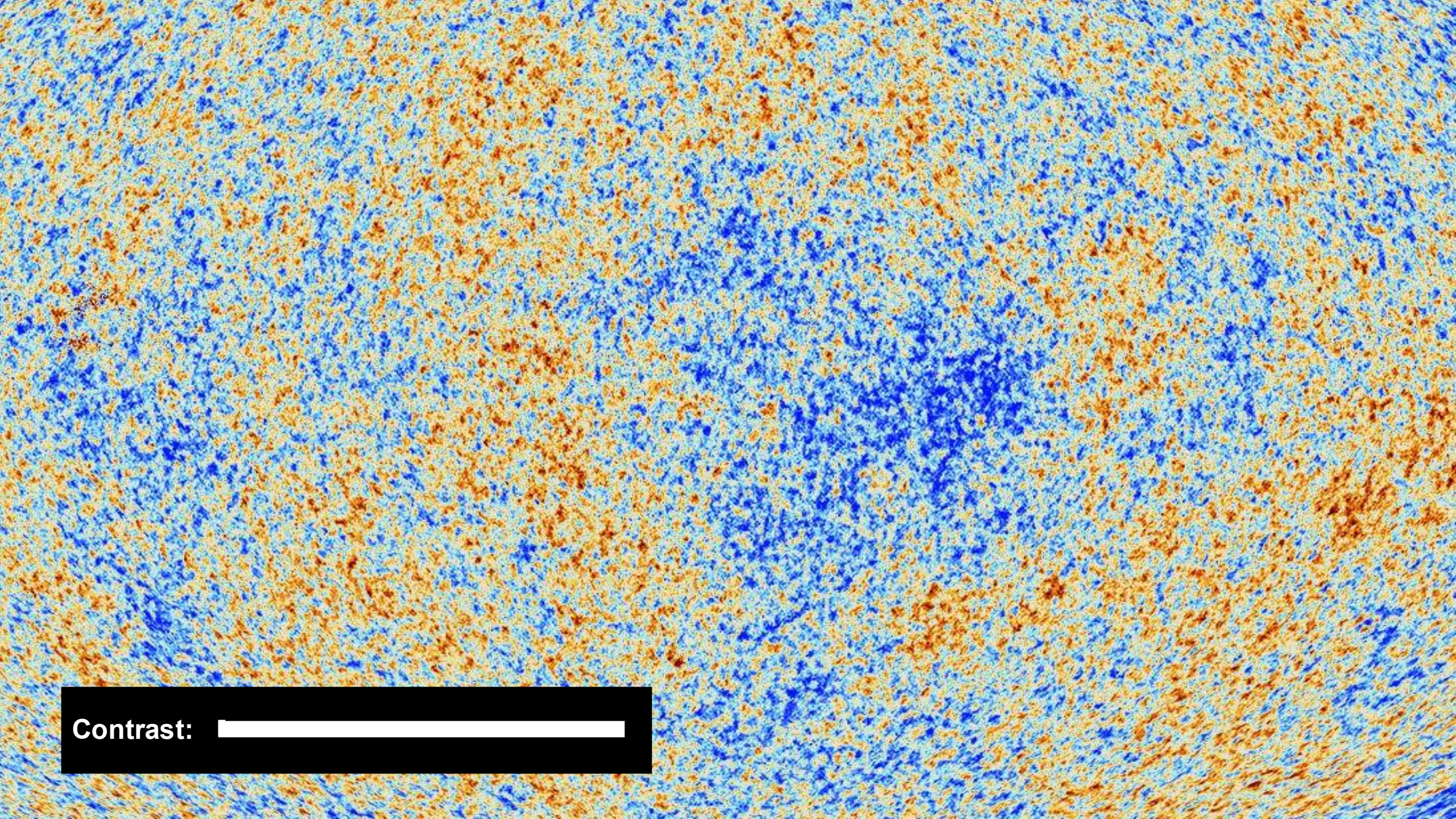


the BIG
BANG
THEORY

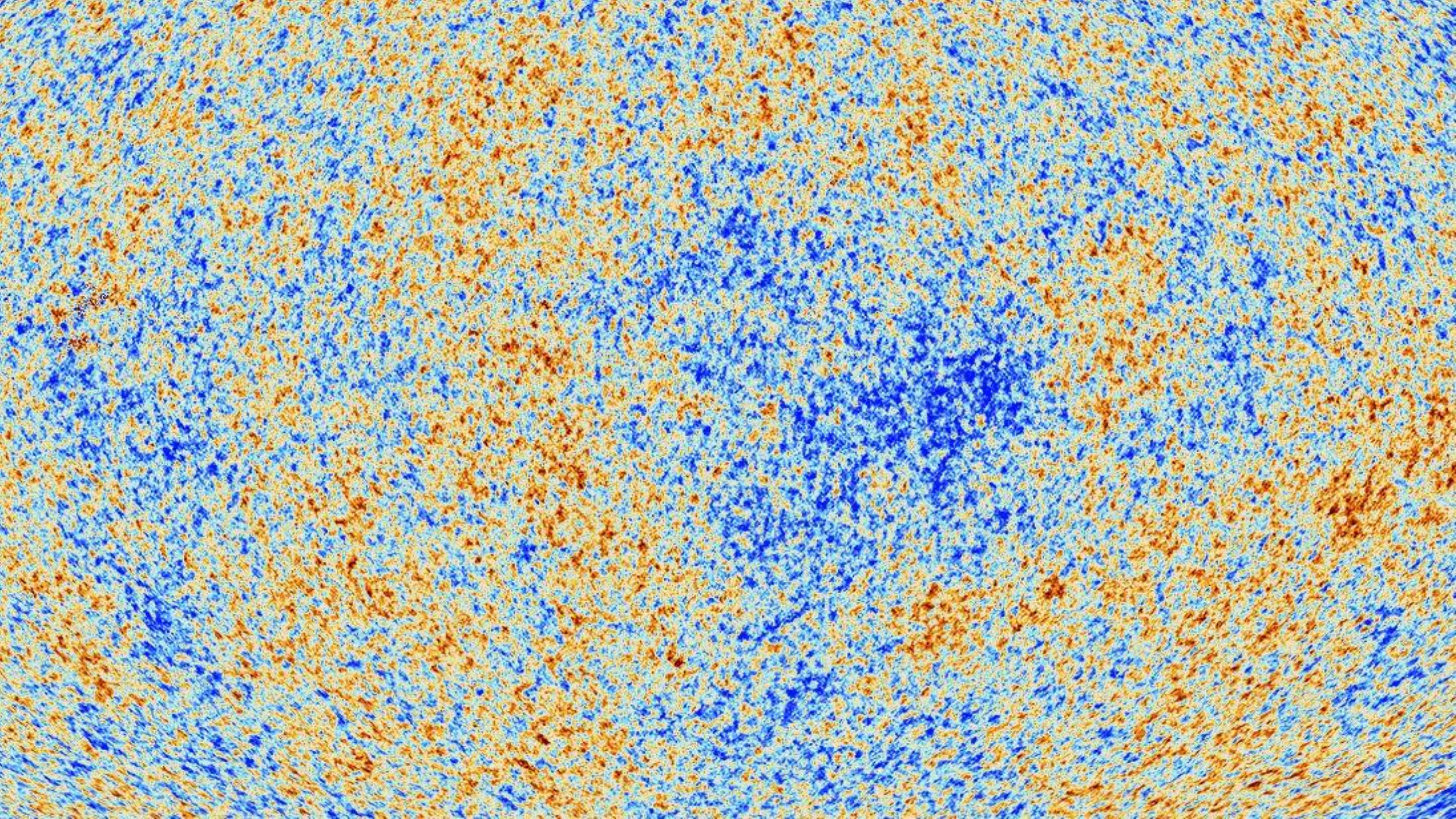
the Λ CDM
Cosmological
MODEL

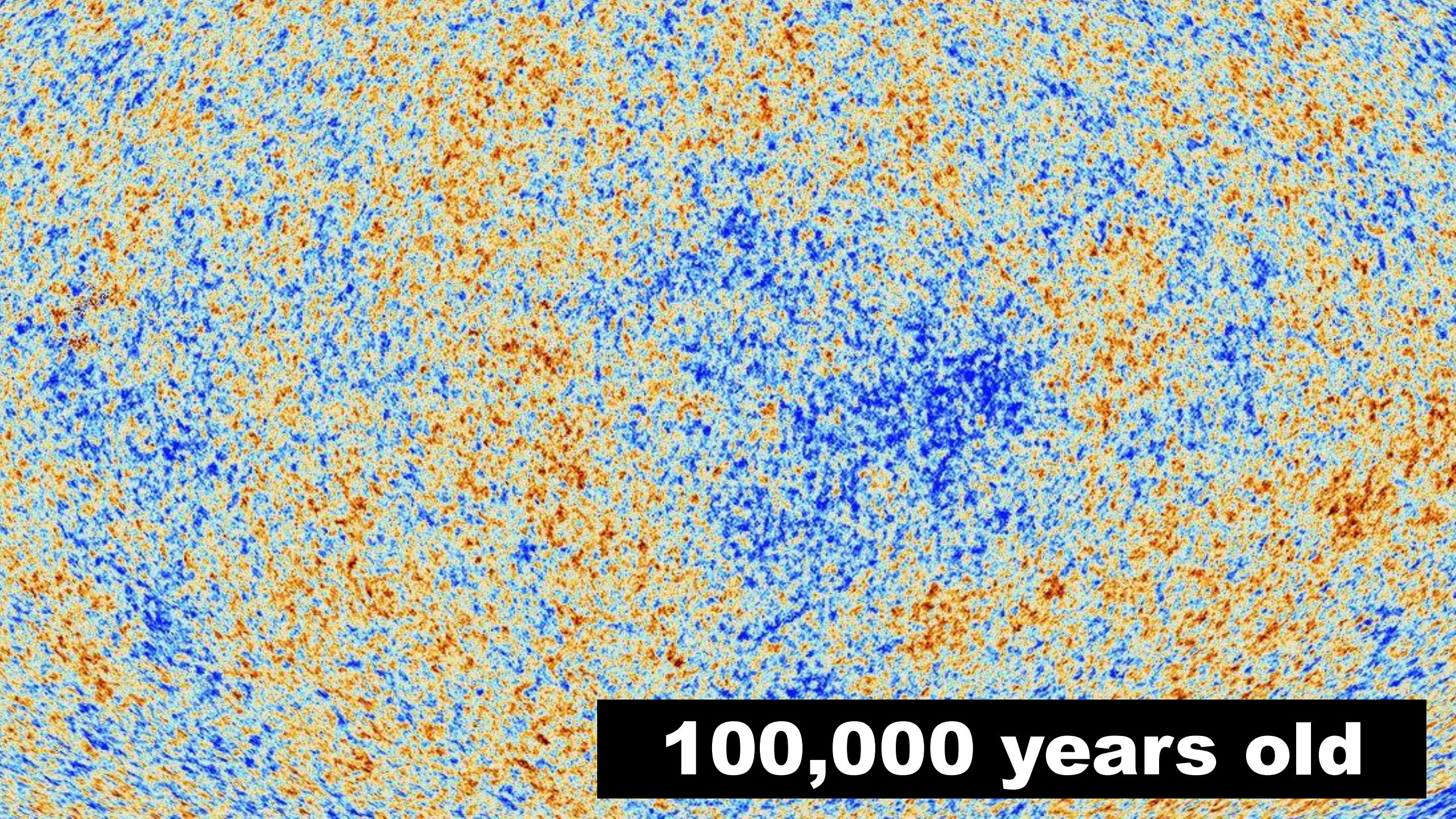
**Shortly After
The Beginning...**





Contrast: 





100,000 years old

**How can you possibly
know that?**



=



The speed of light

The speed of light

300,000 km/s

(186,000 mi/s)

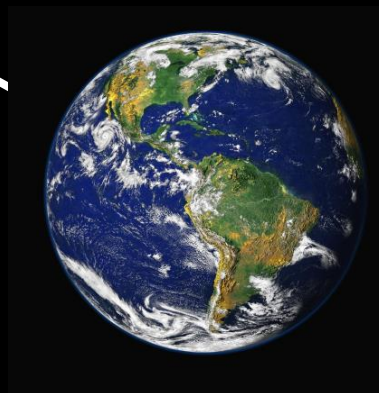


The Moon
1.3 seconds

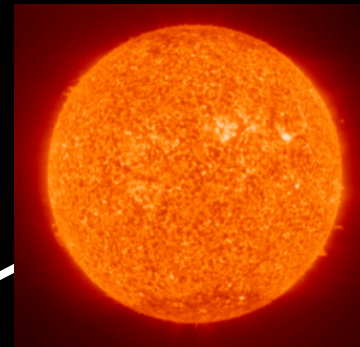




The Moon
1.3 seconds

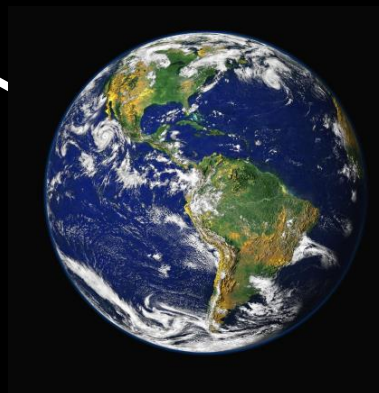


The Sun
8 minutes

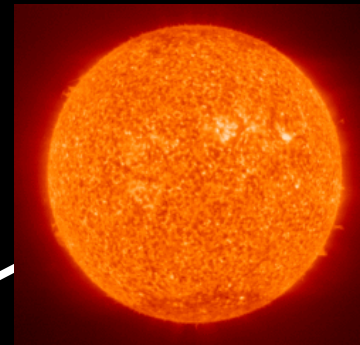




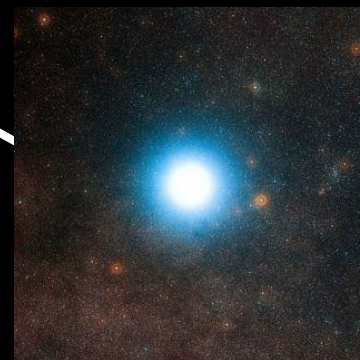
The Moon
1.3 seconds



The Sun
8 minutes

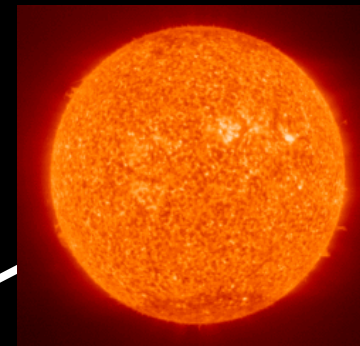


Alpha Centauri
4 years





The Moon
1.3 seconds

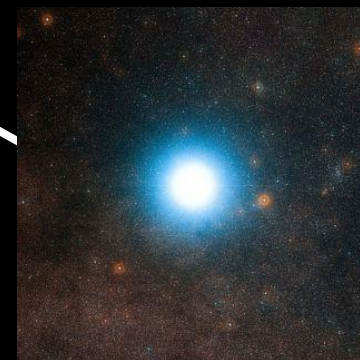


The Sun
8 minutes

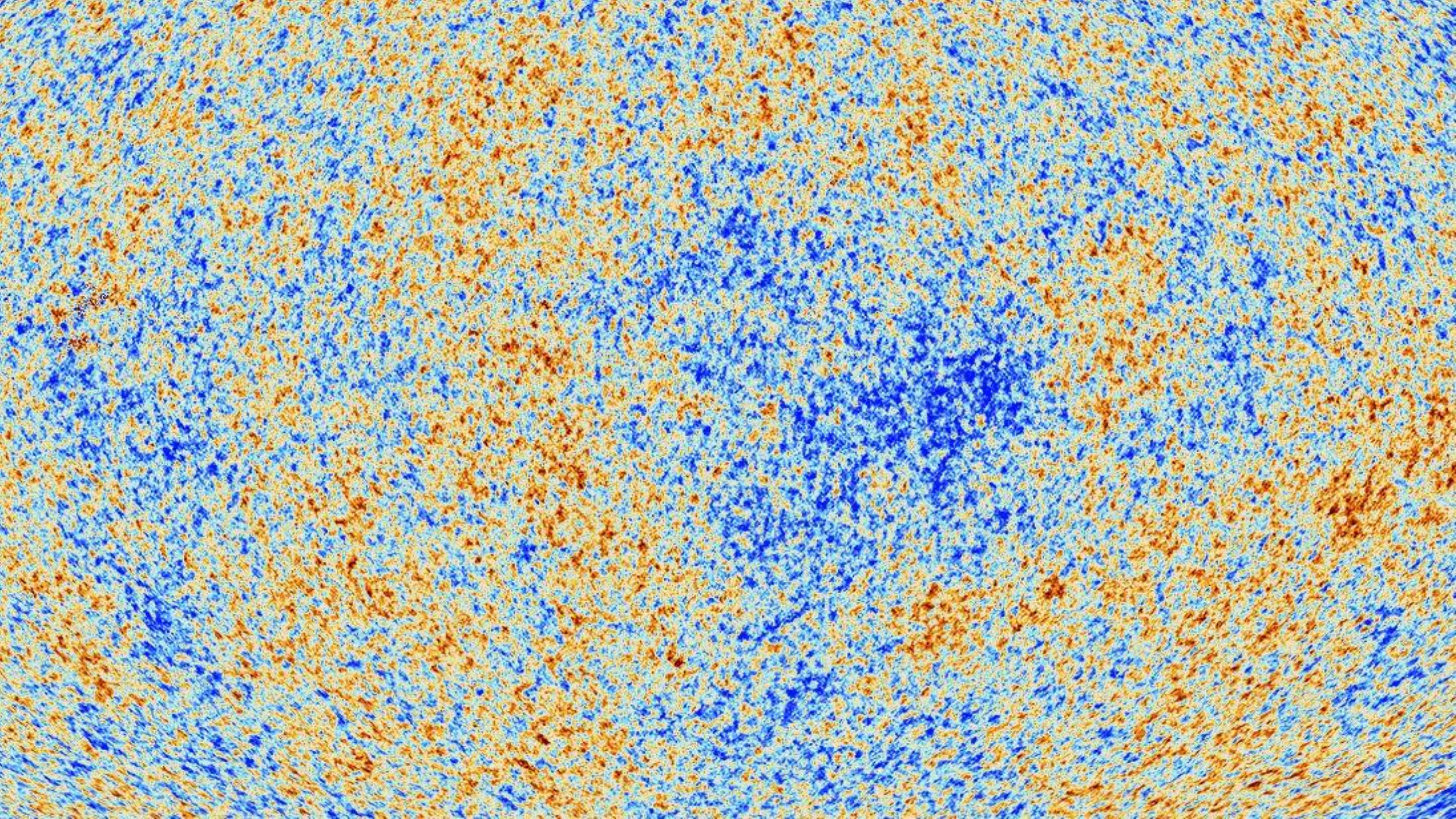


Andromeda
2.5 million years

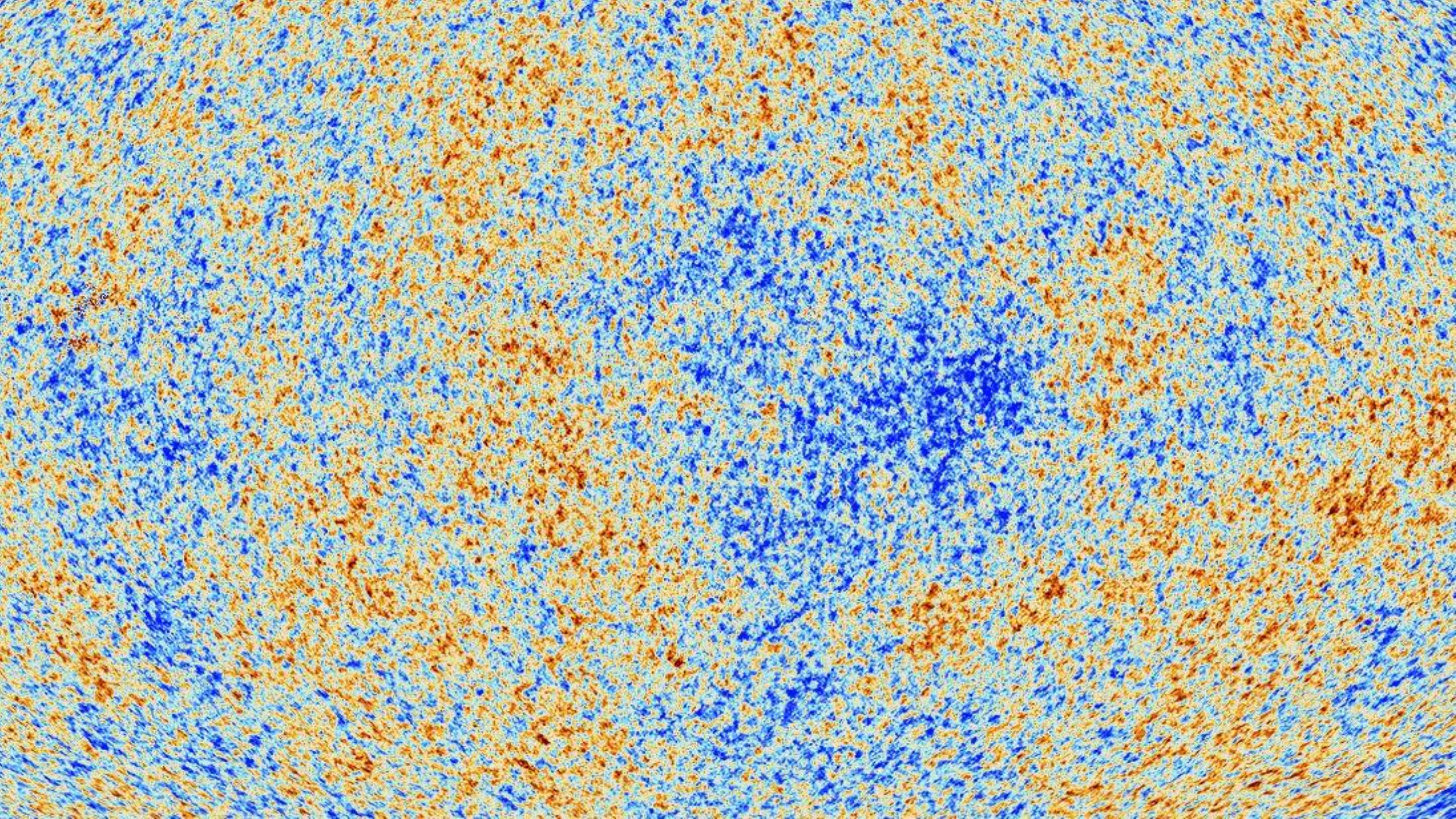
Alpha Centauri
4 years



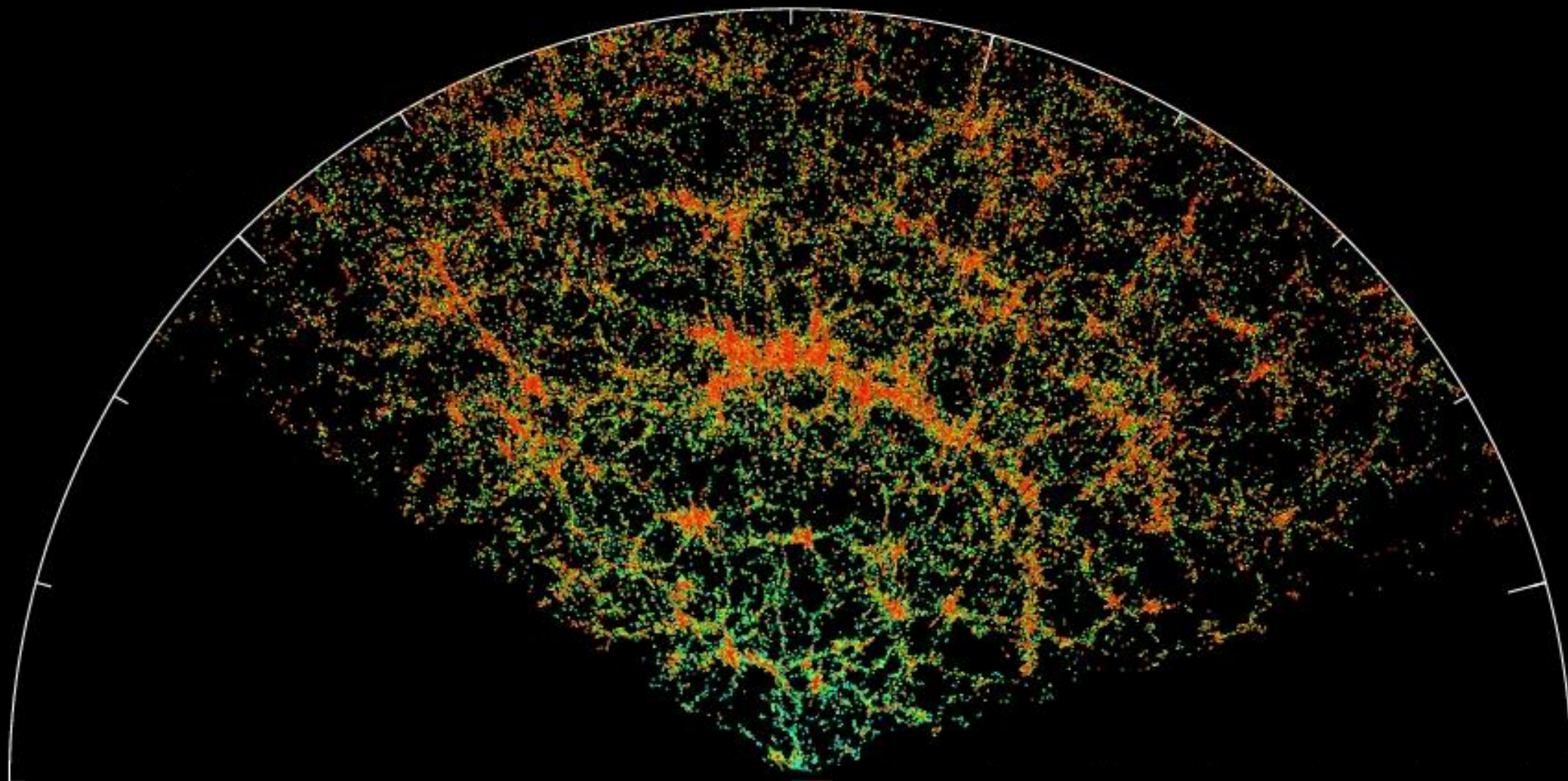




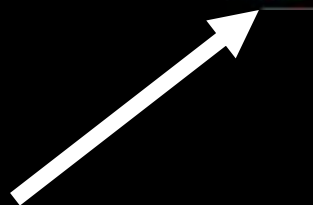
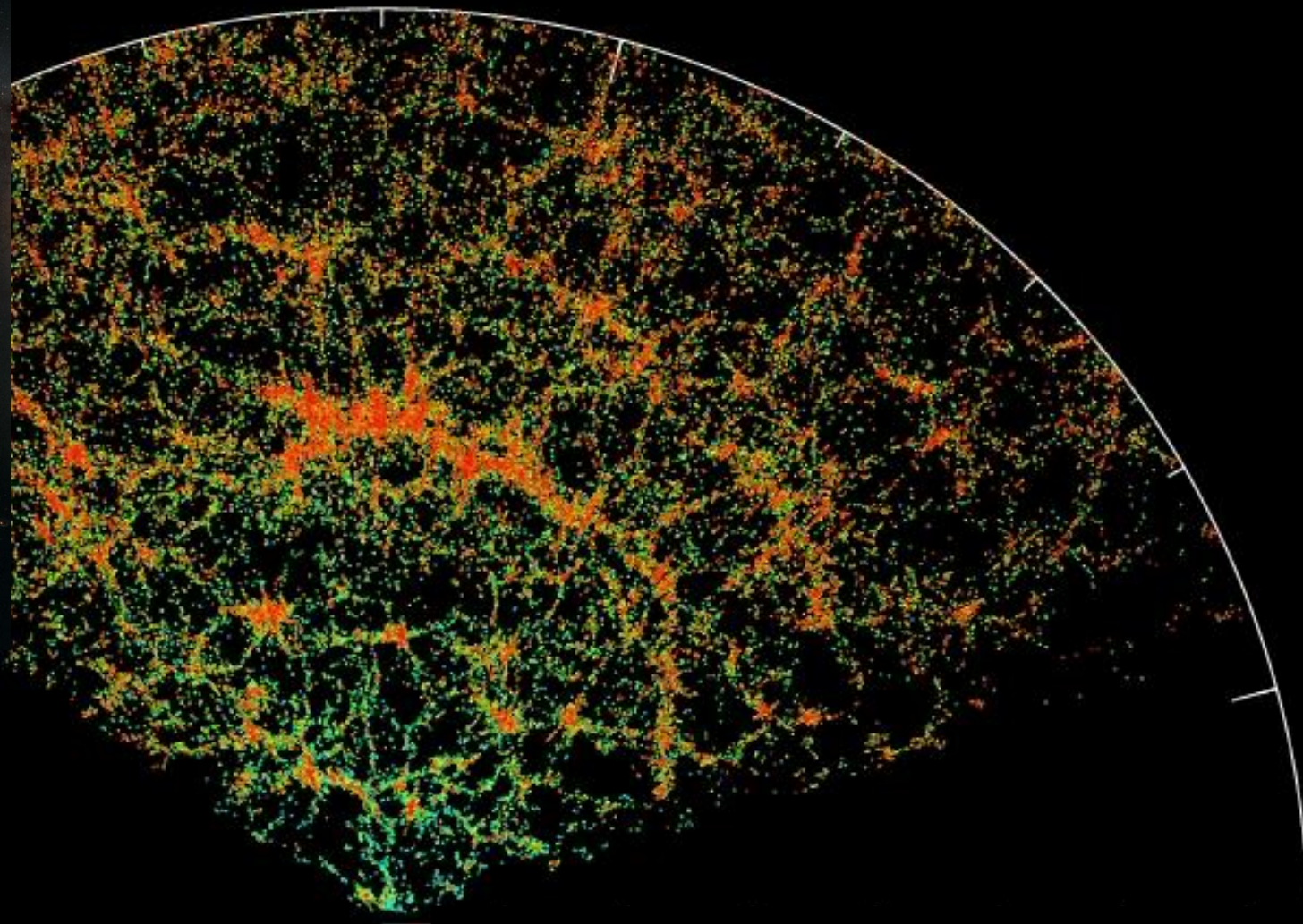
0.001%
OFF!!!!



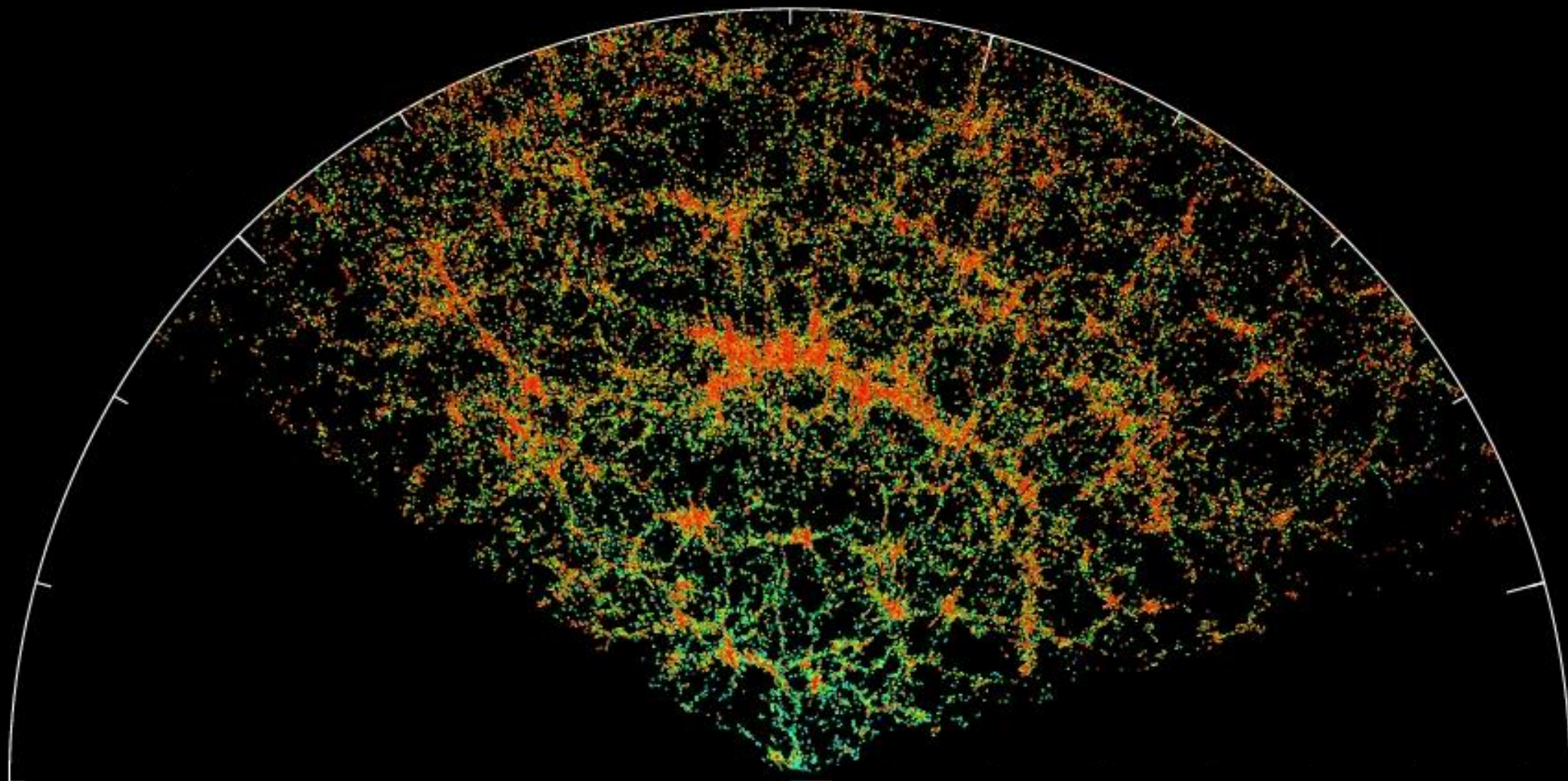
The Dark Ages



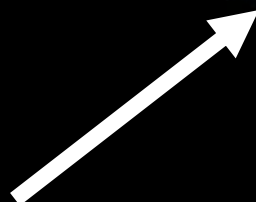
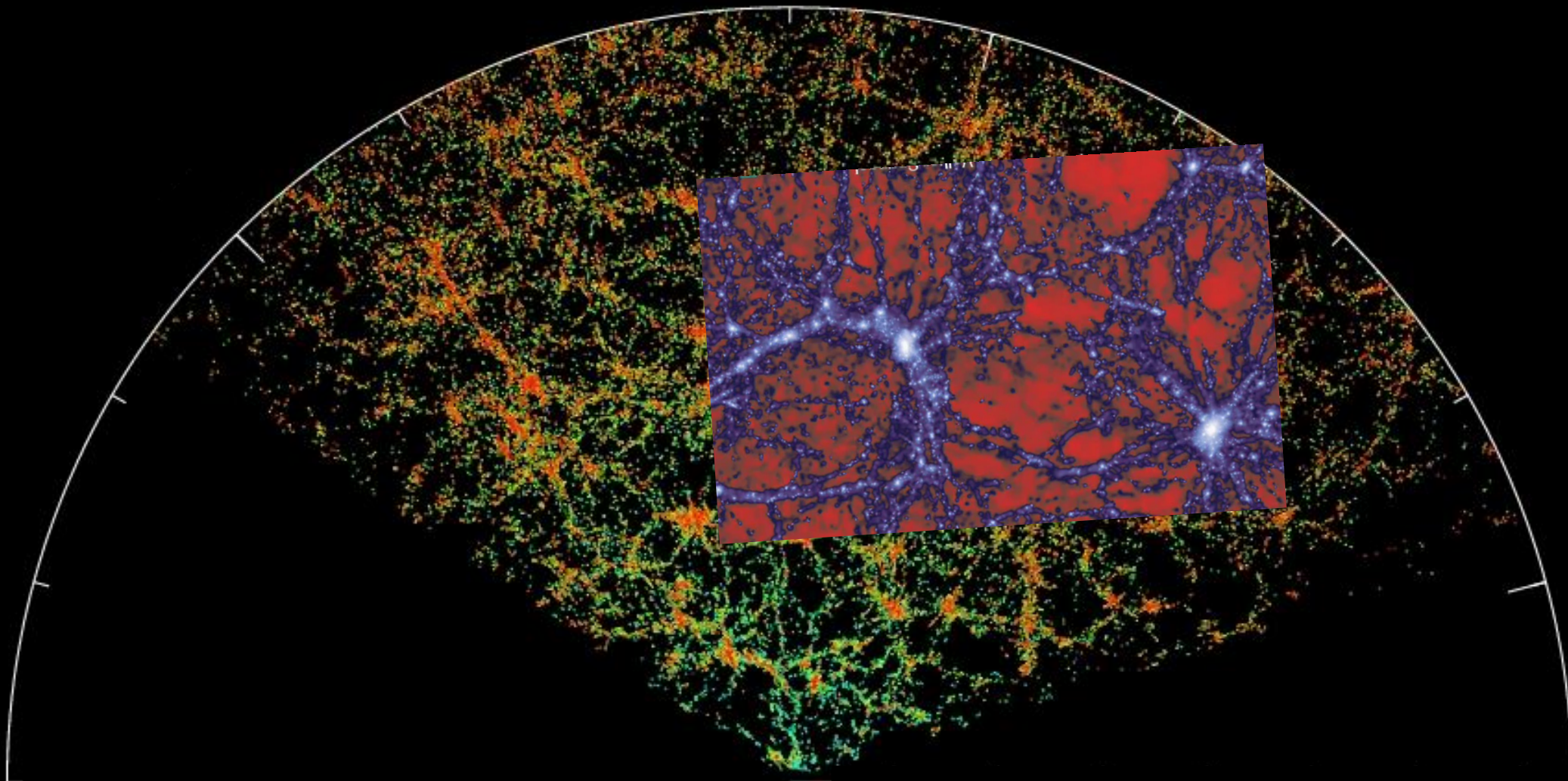
YOU ARE HERE



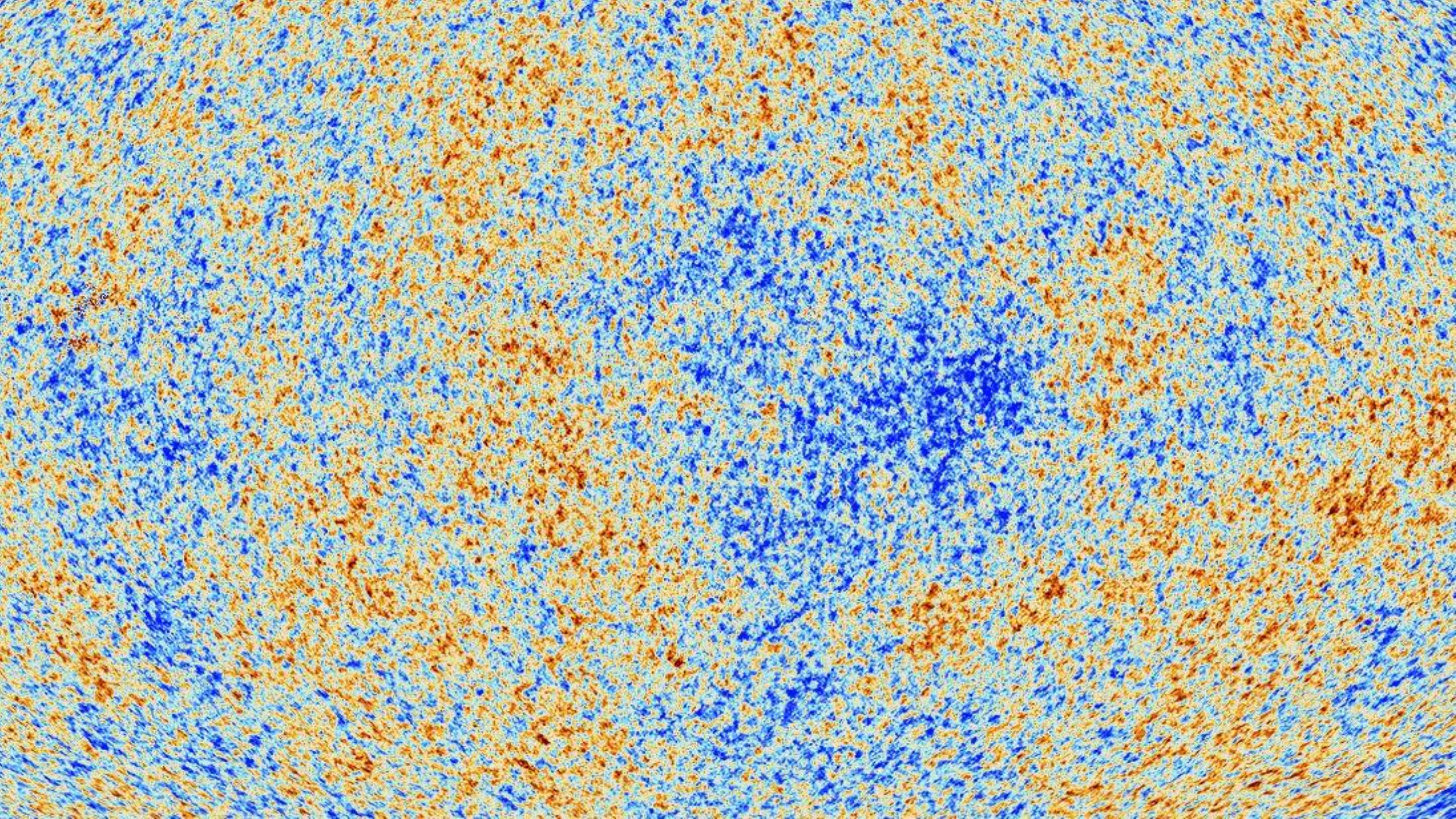
YOU ARE HERE

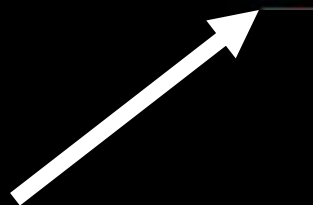
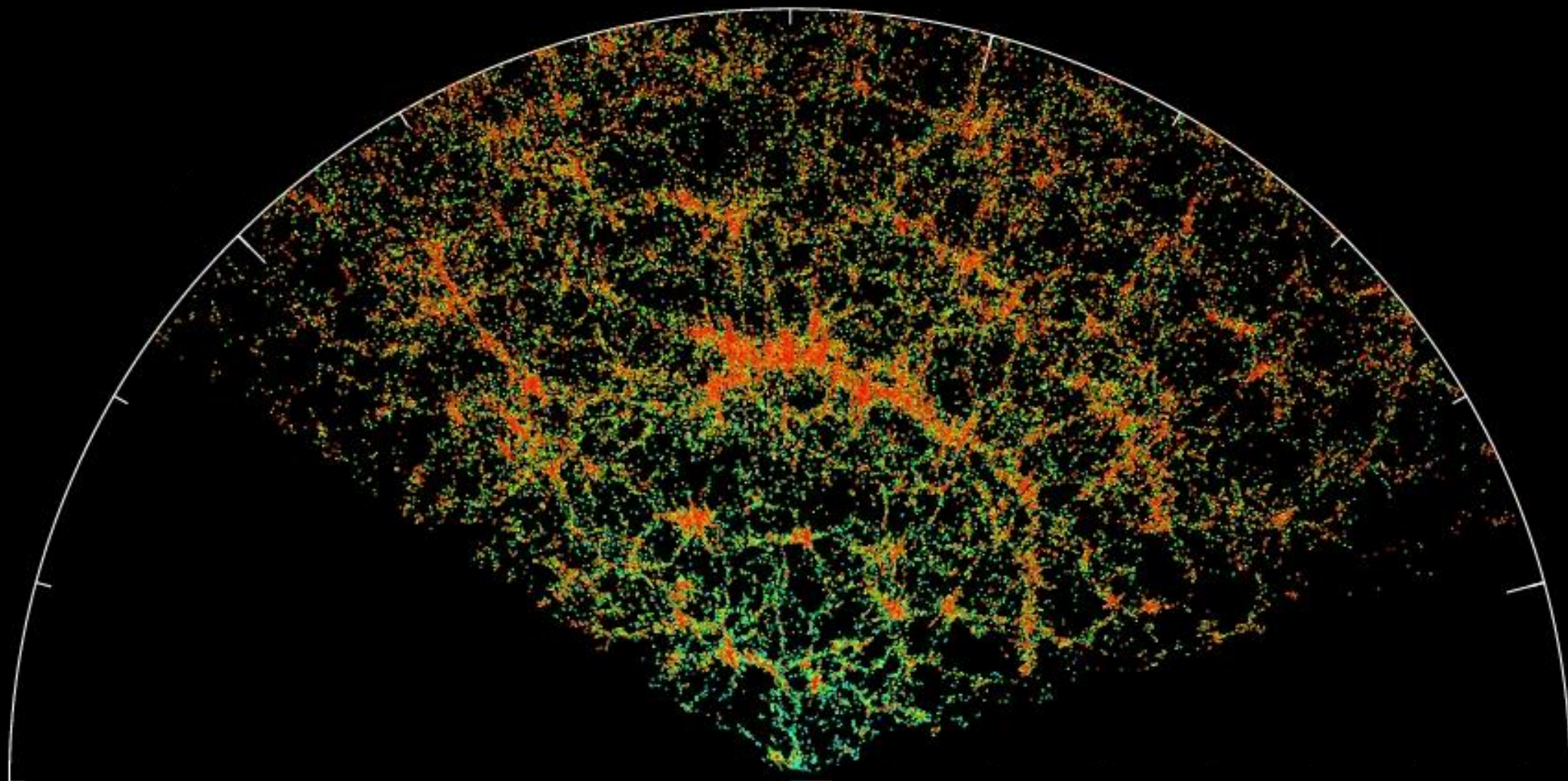


YOU ARE HERE



YOU ARE HERE





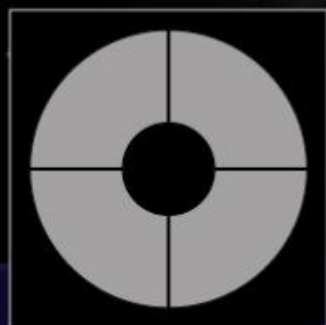
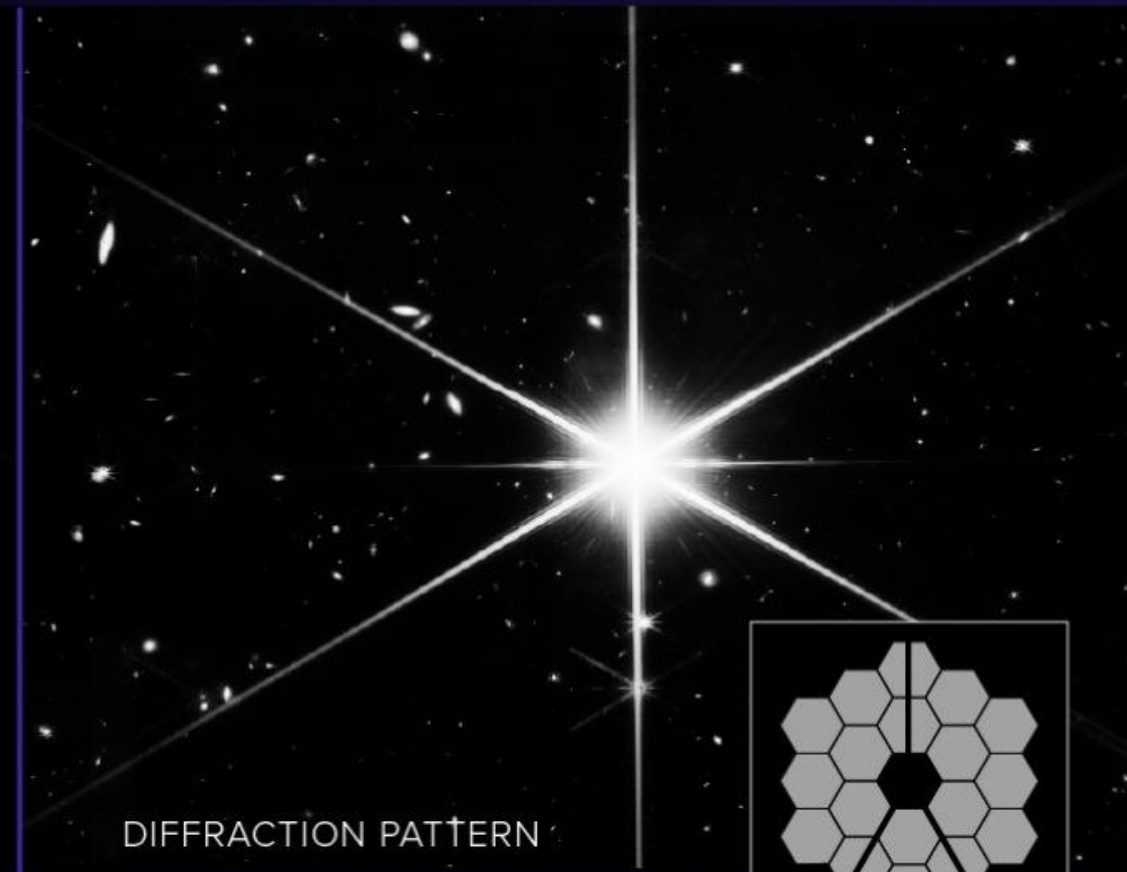
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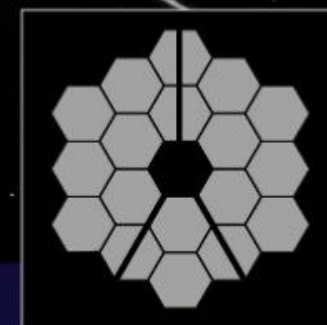
HUBBLE

WEBB



MIRROR AND STRUTS

DIFFRACTION PATTERN

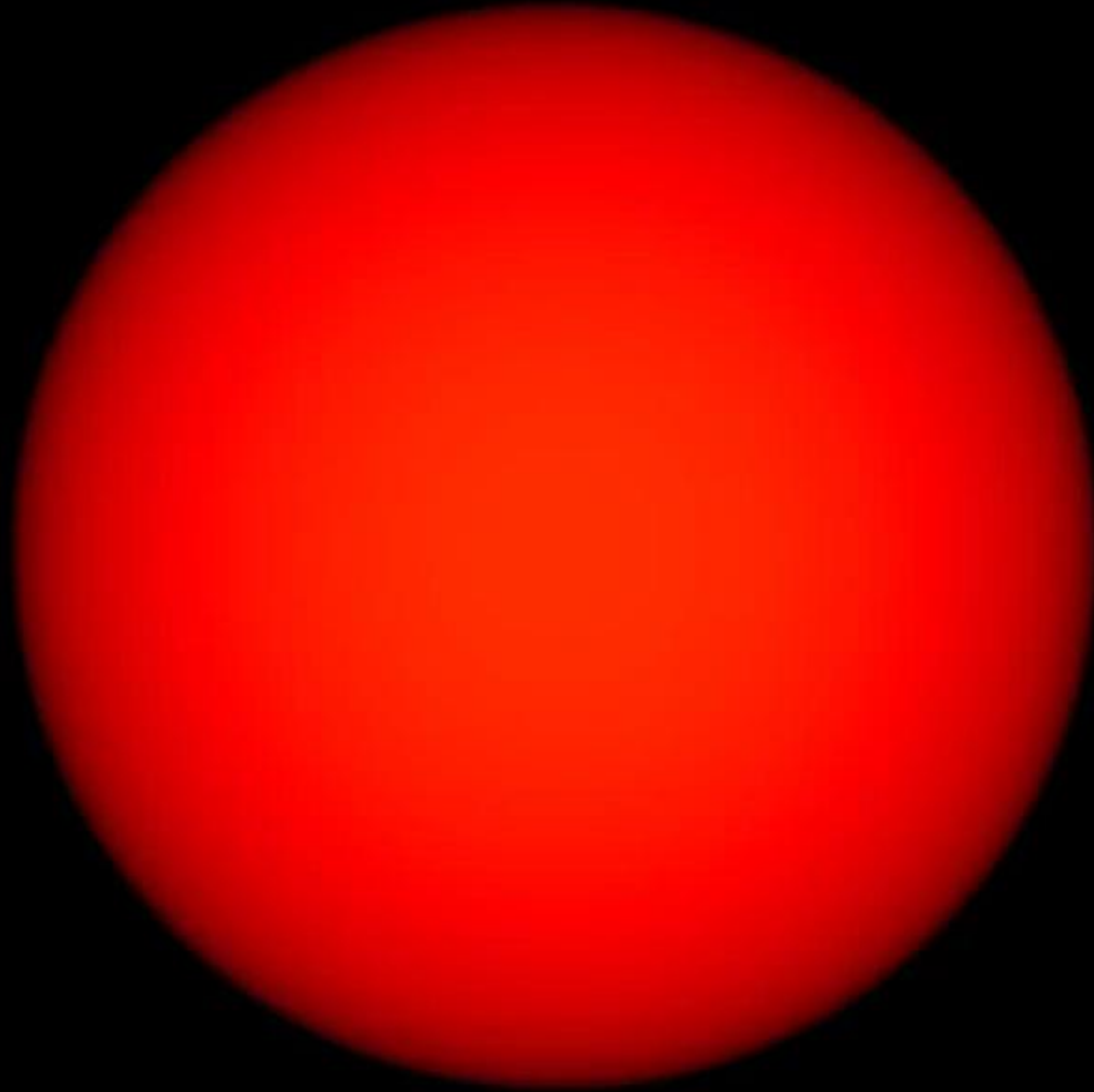


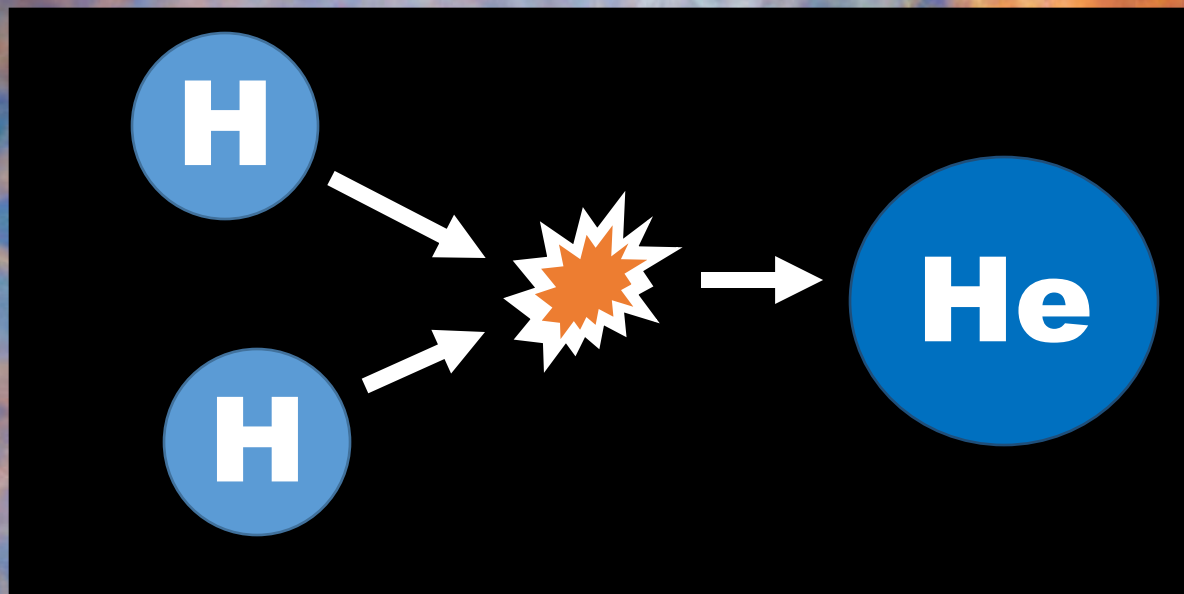
MIRROR AND STRUTS

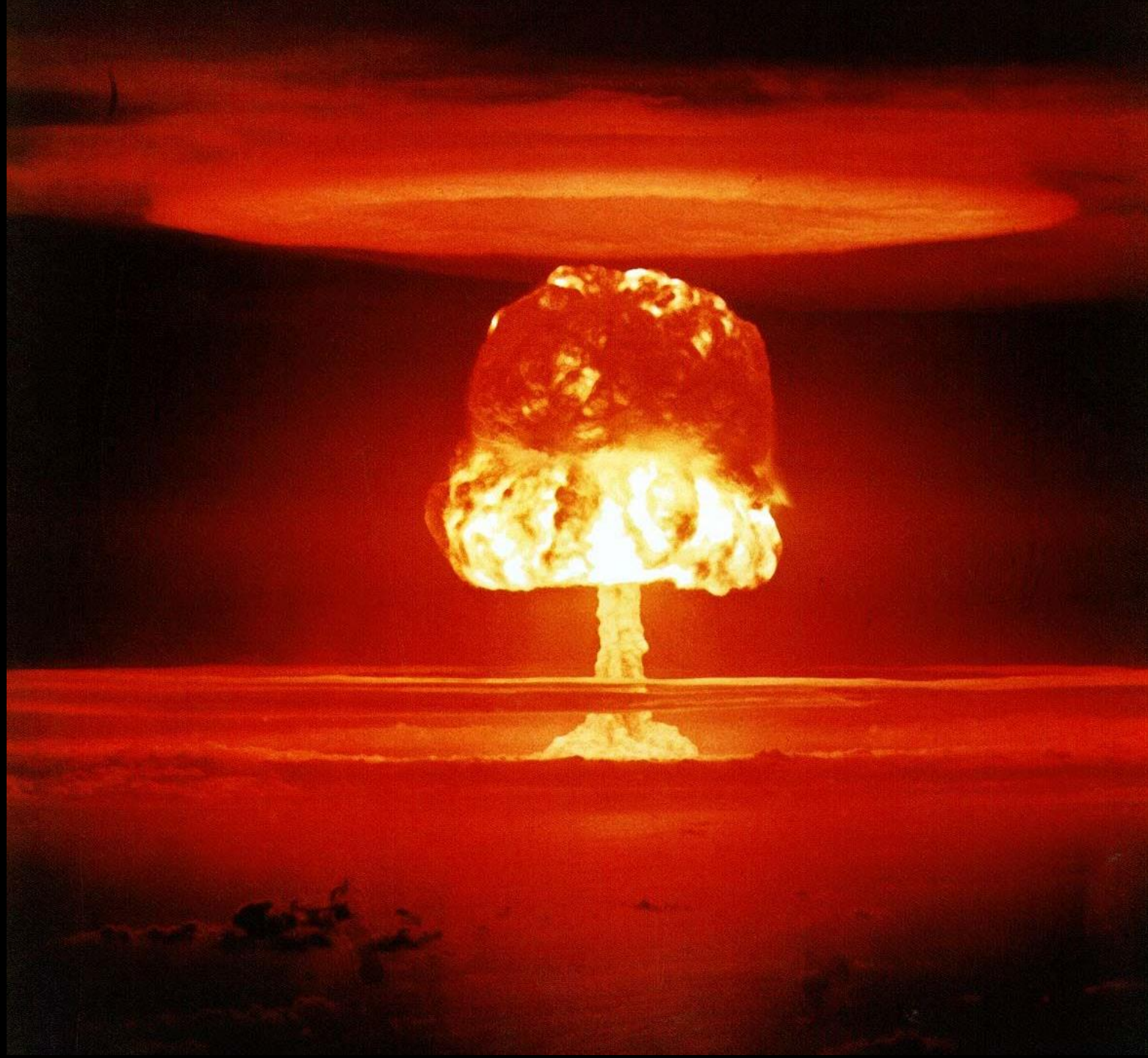
DIFFRACTION PATTERN

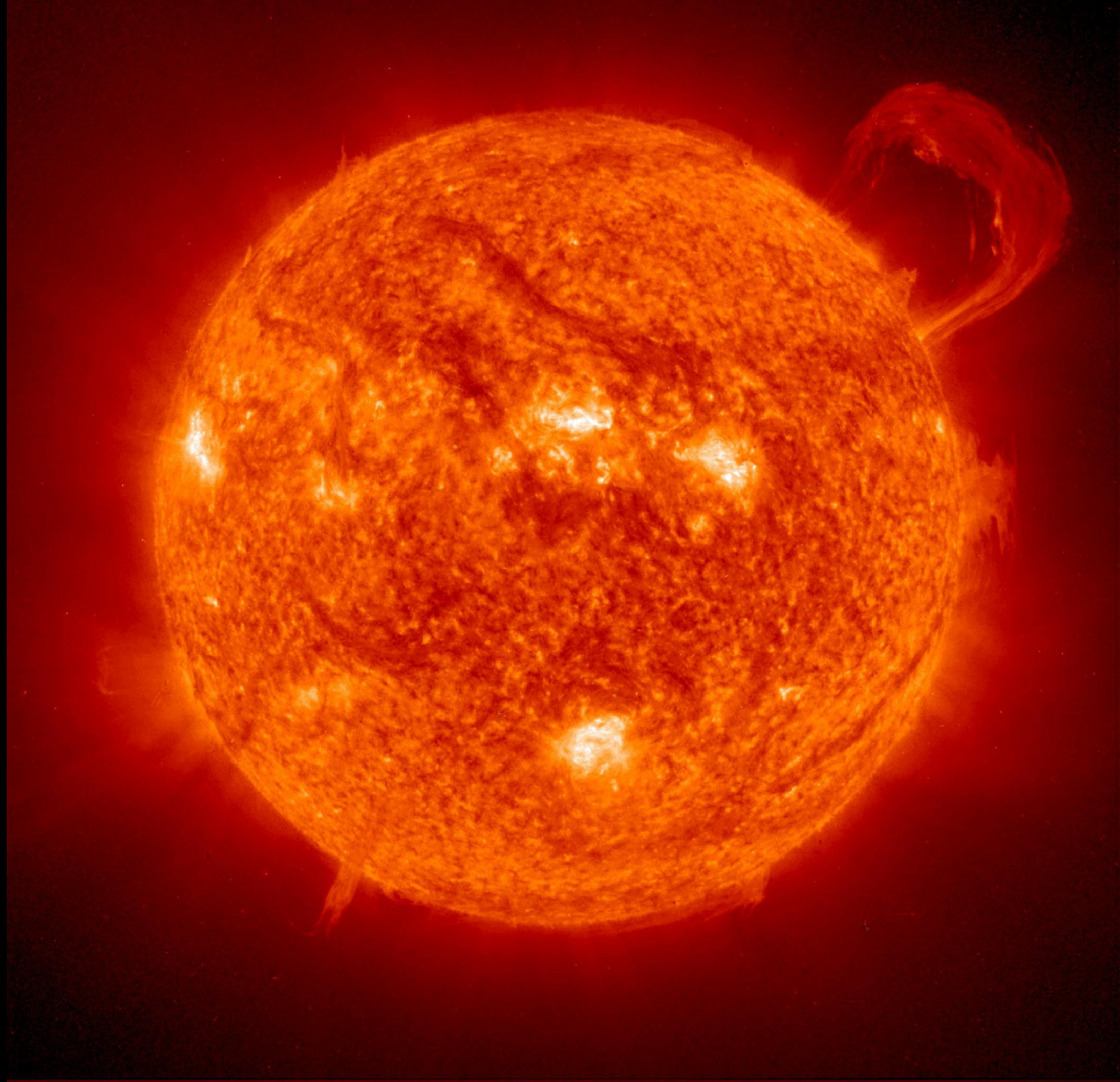






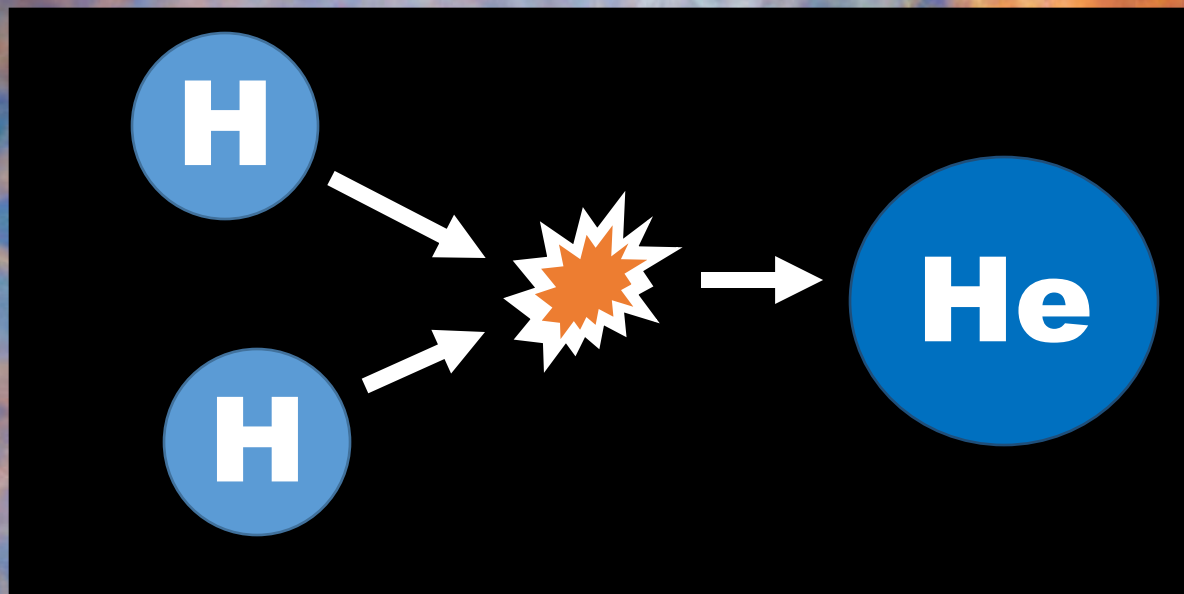












Element Origins

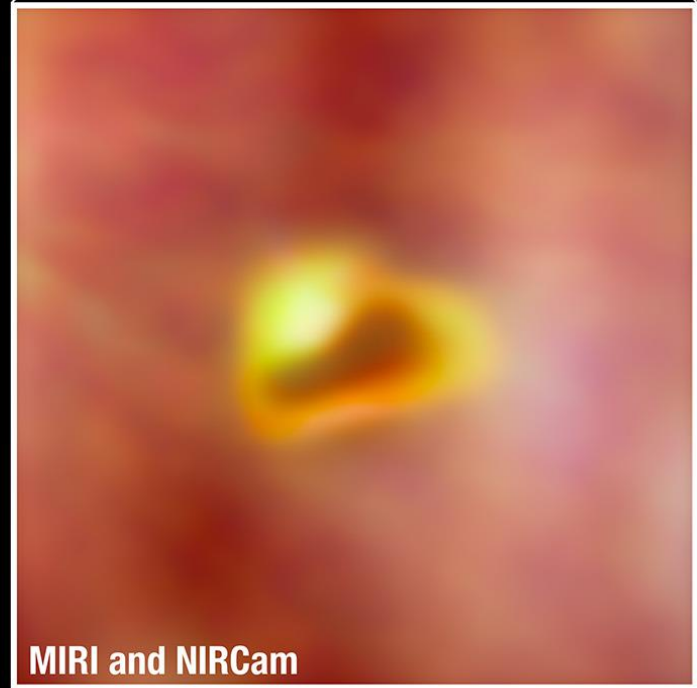
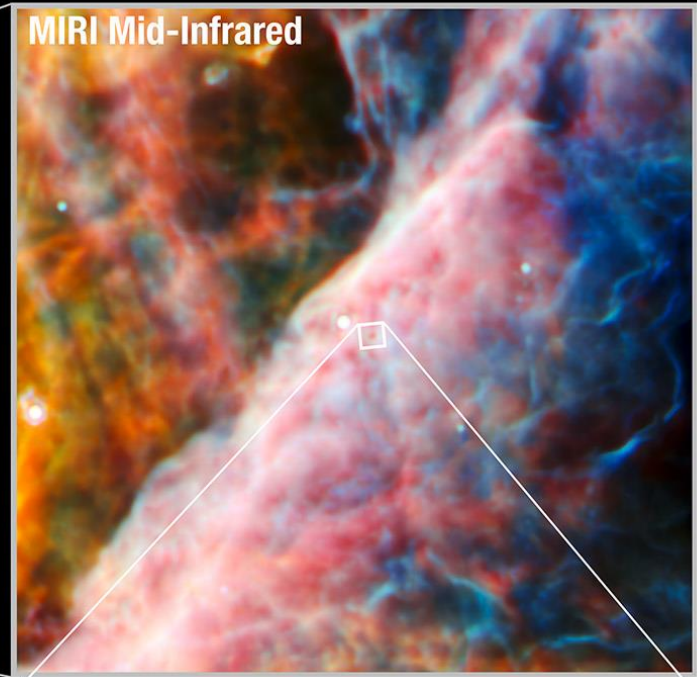
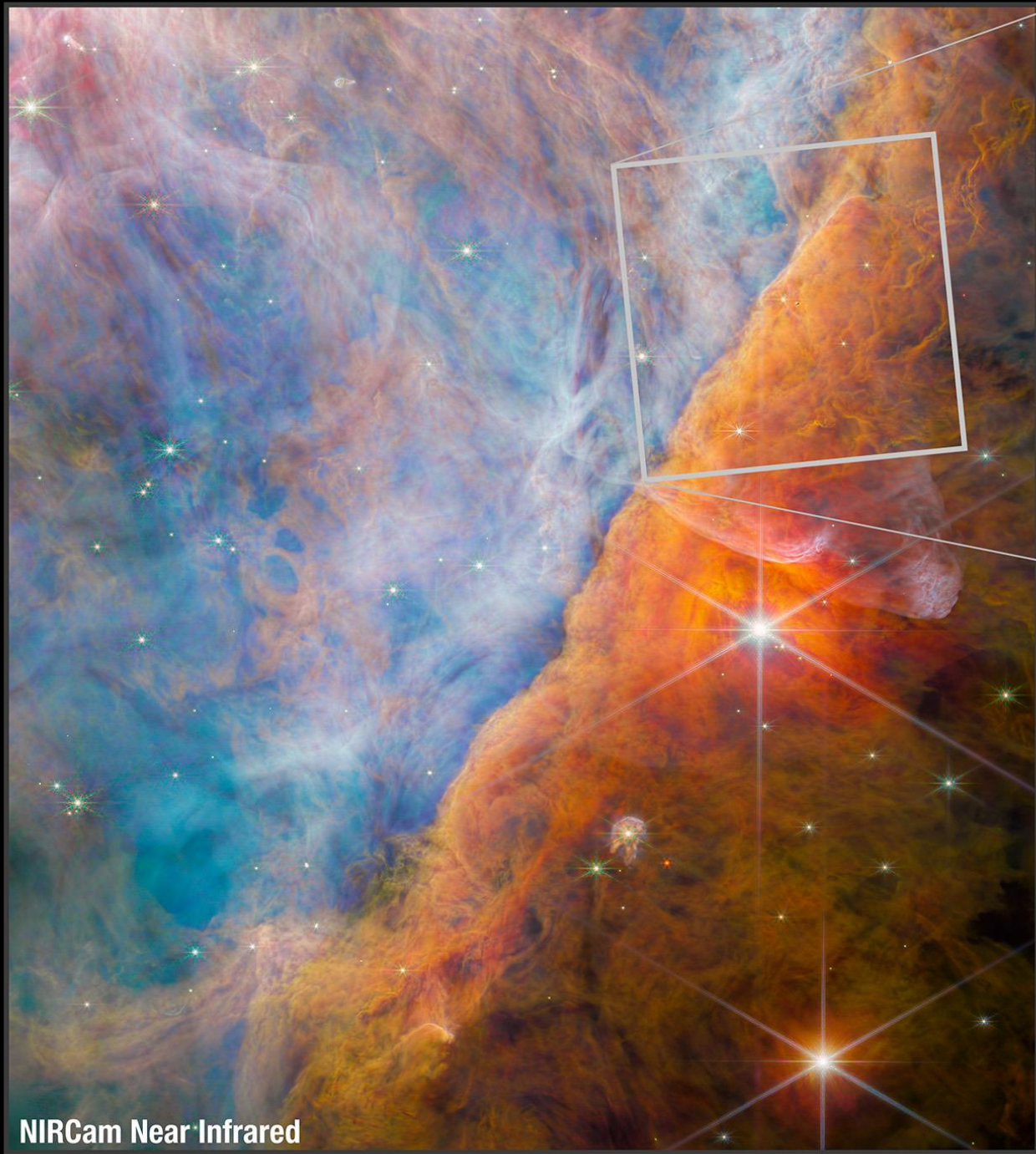
Element Origins																		2 He	
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne		
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar		
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr		
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe		
55 Cs	56 Ba			72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
87 Fr	88 Ra																		
		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu			
		89 Ac	90 Th	91 Pa	92 U														

Merging Neutron Stars
Dying Low Mass Stars

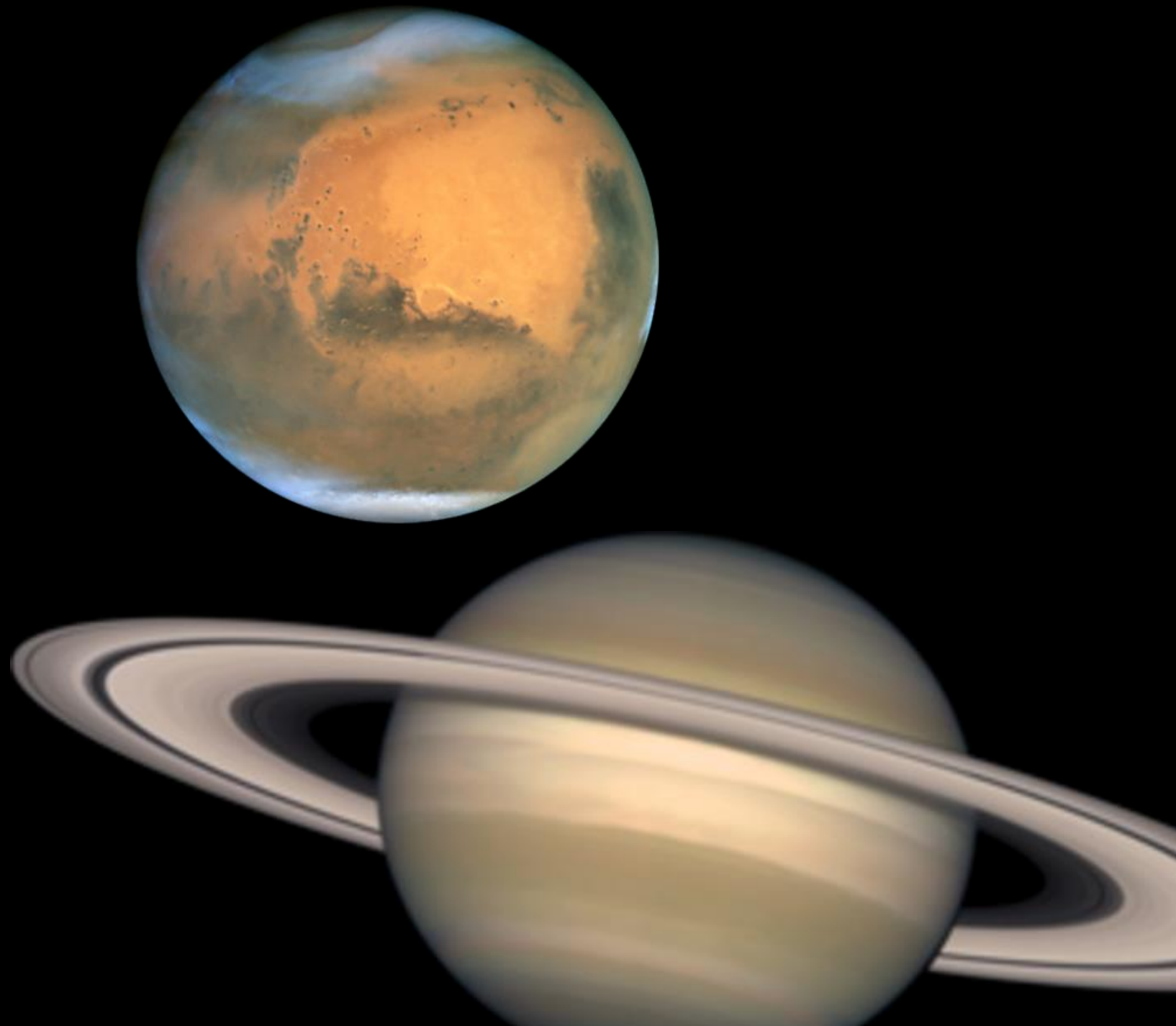
Exploding Massive Stars
Exploding White Dwarfs

Big Bang
Cosmic Ray Fission

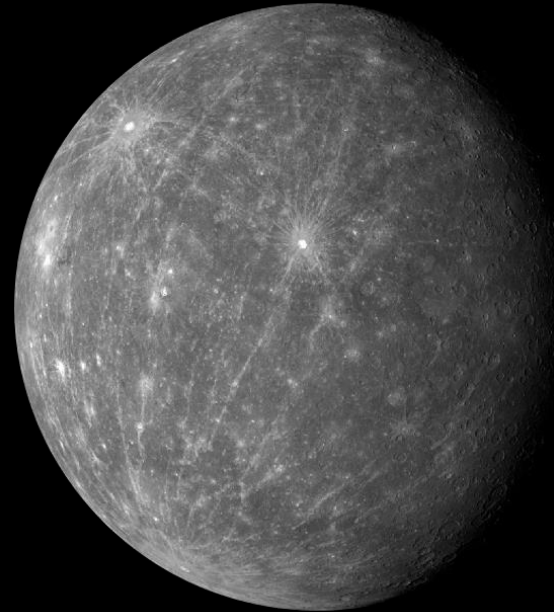


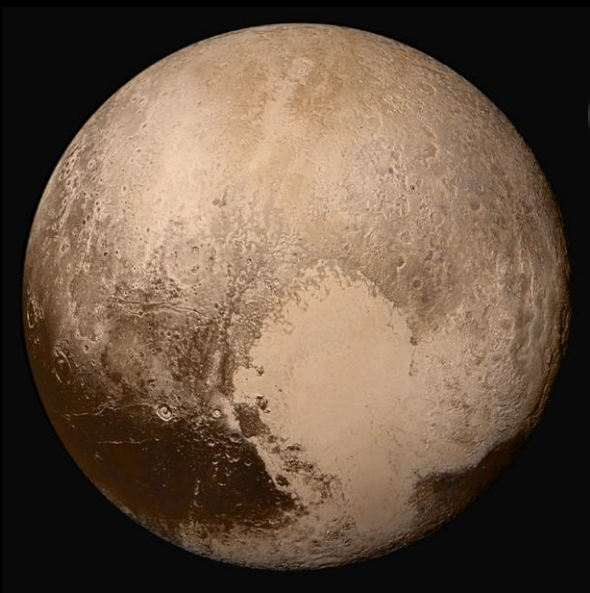
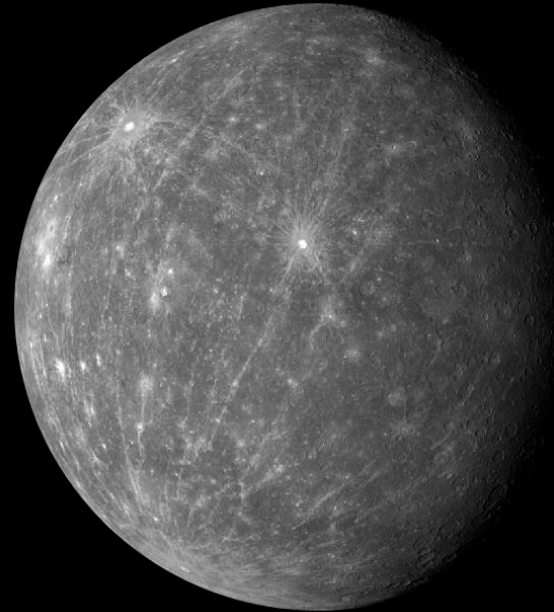






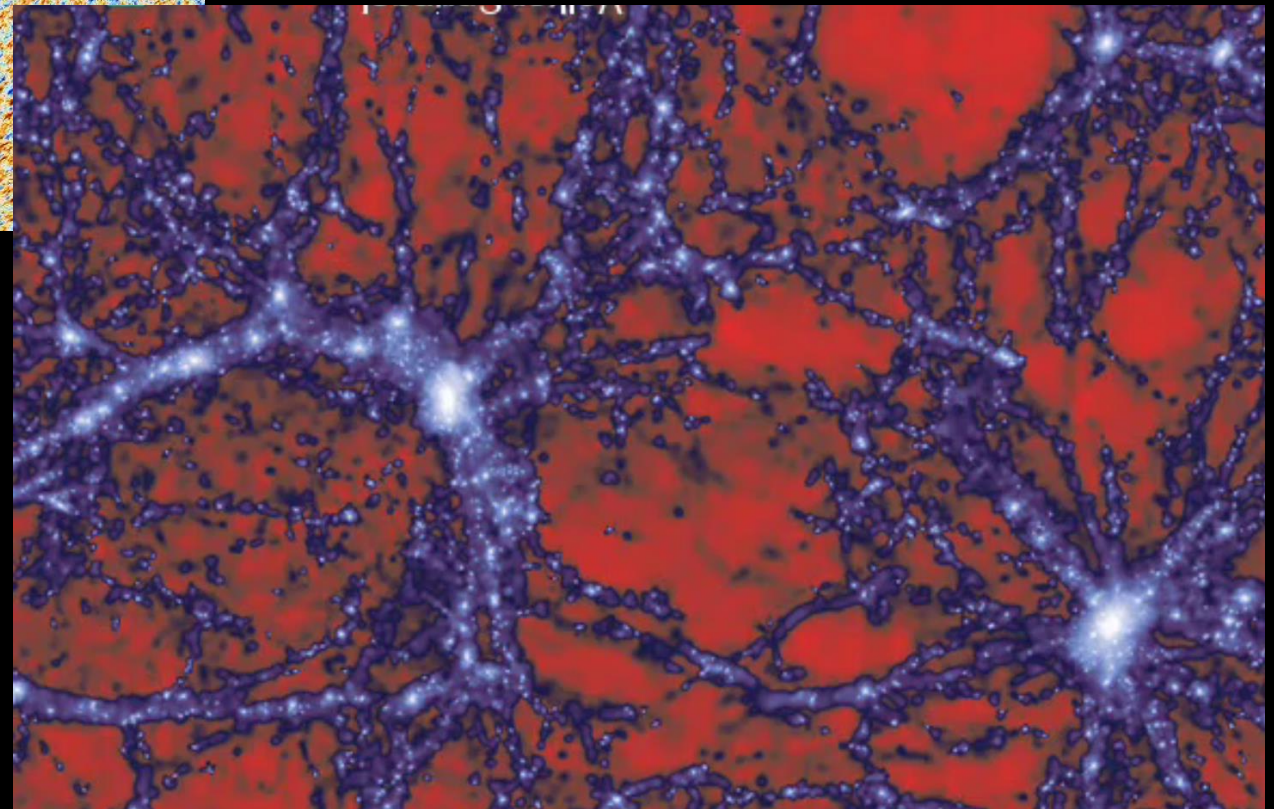
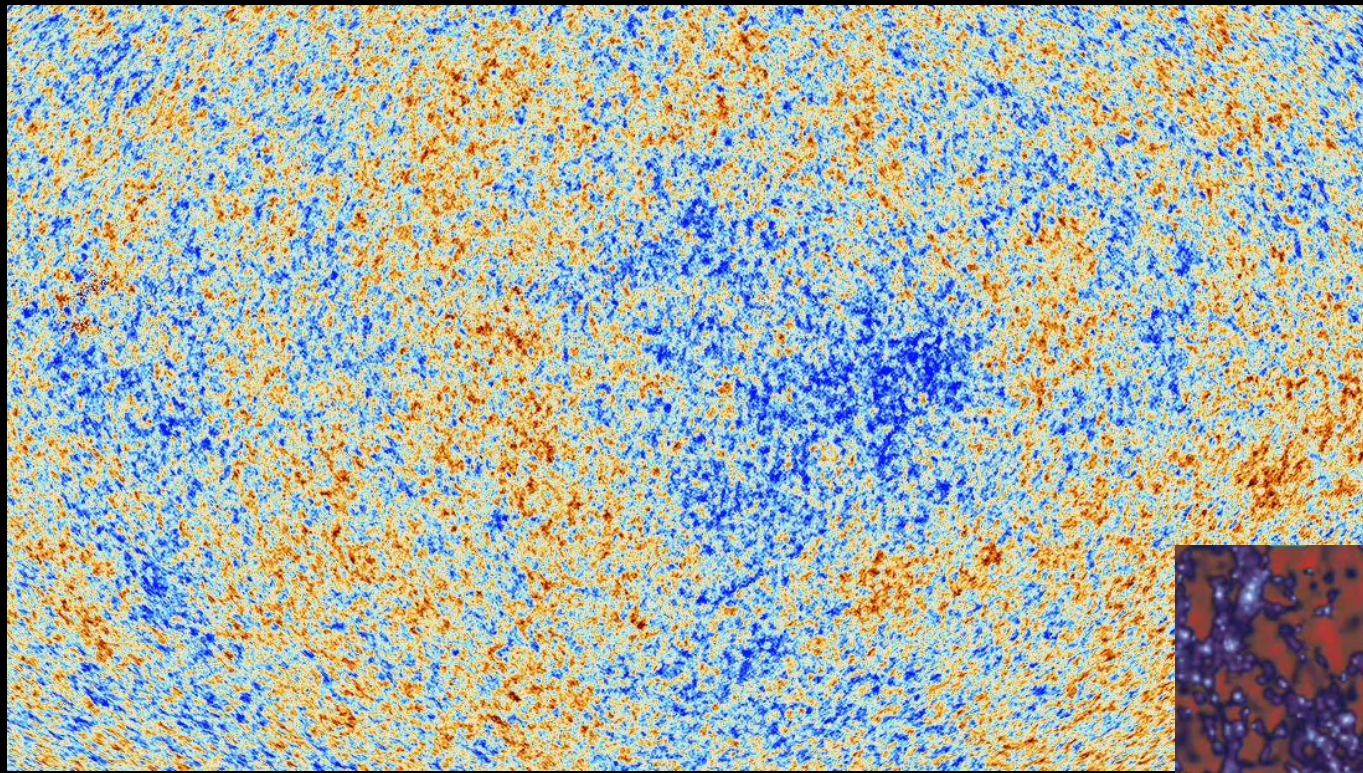


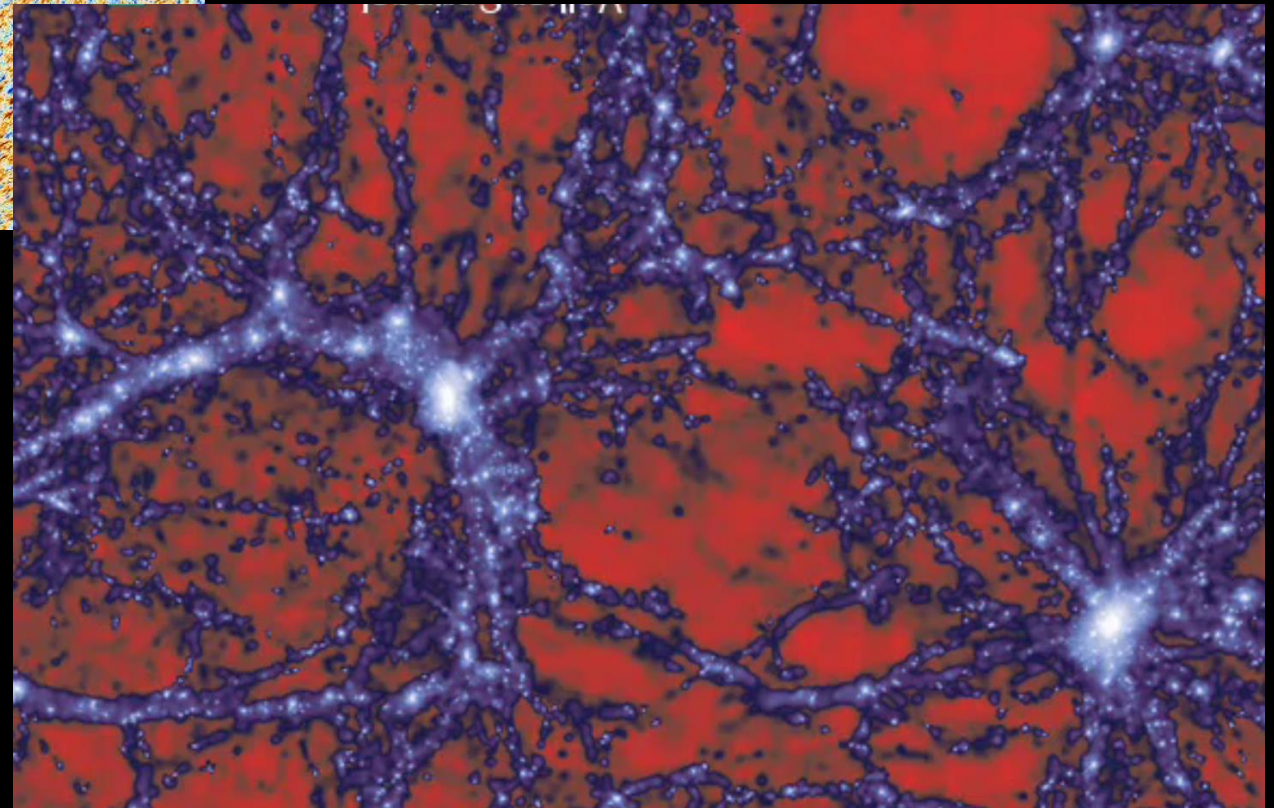
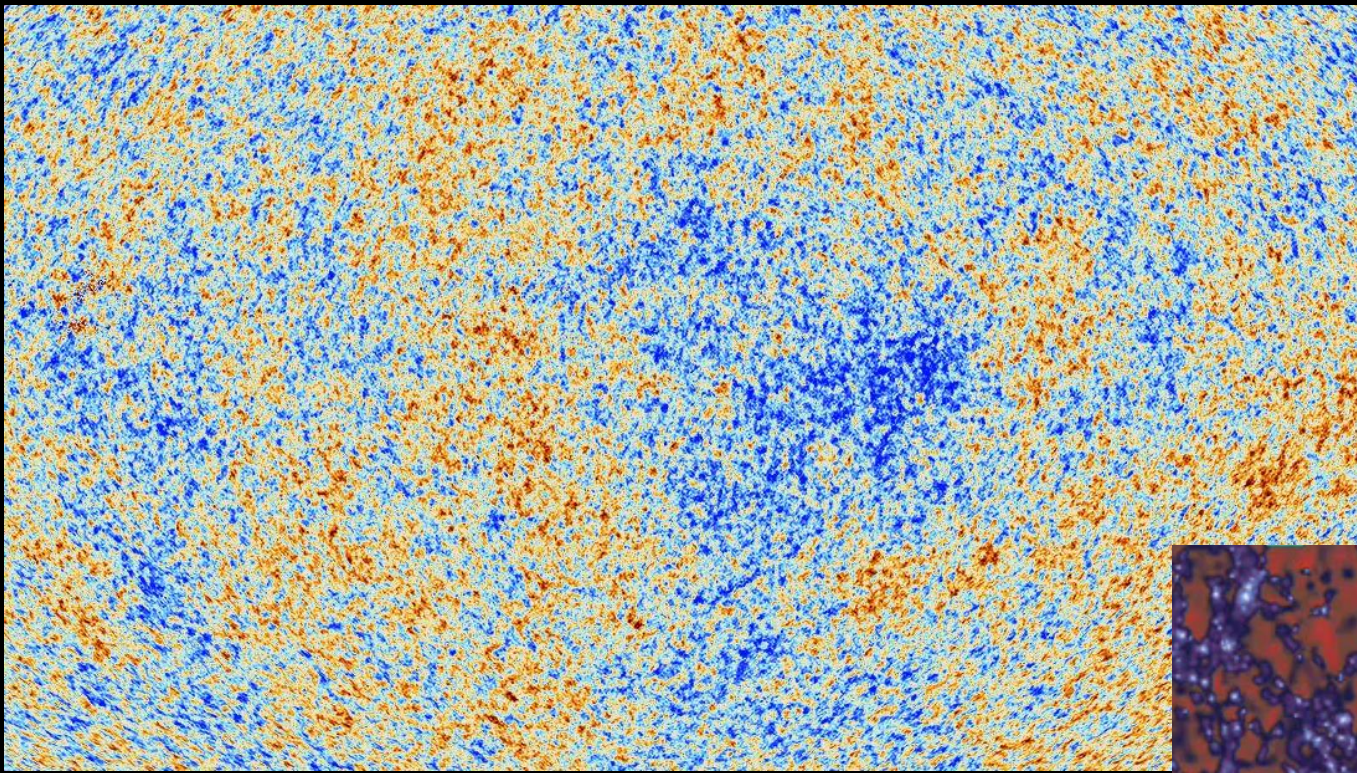




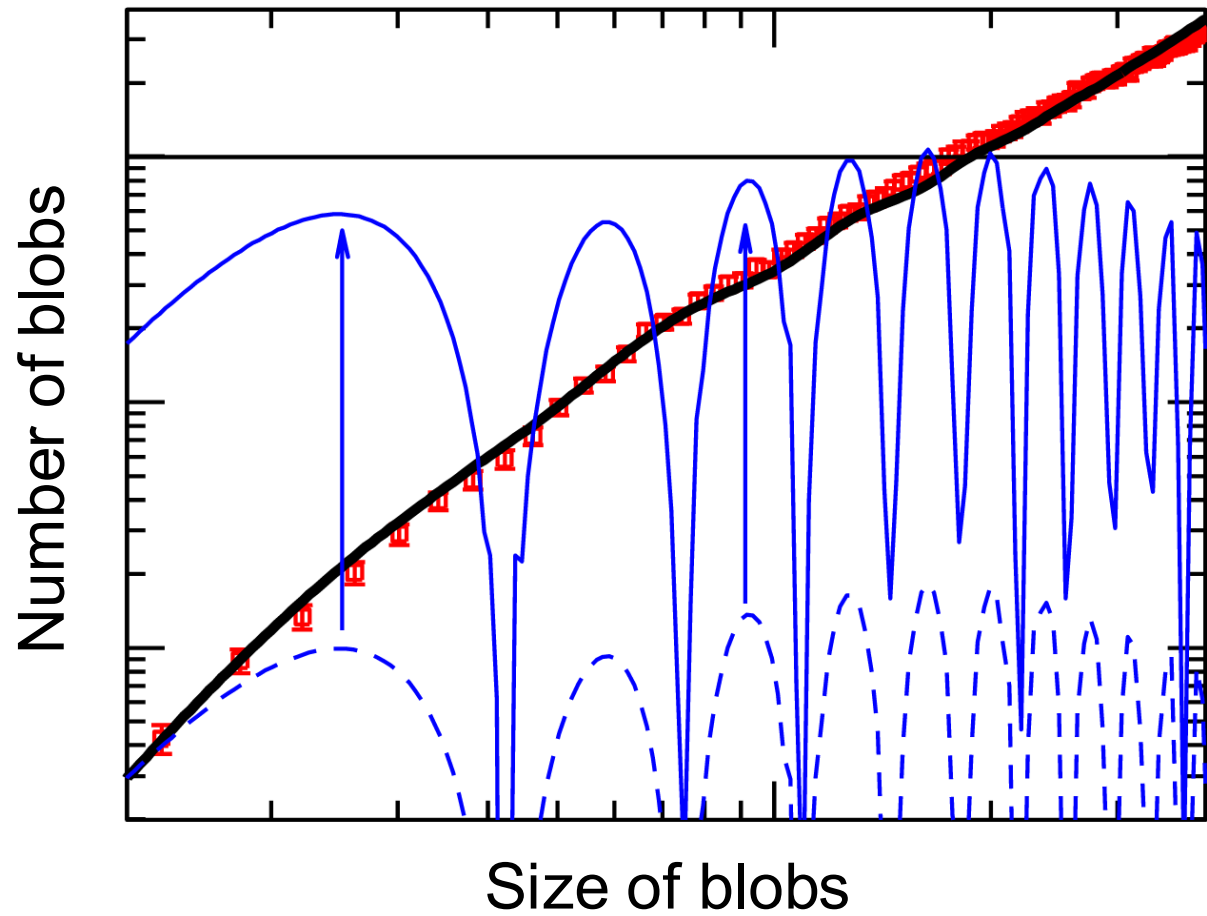




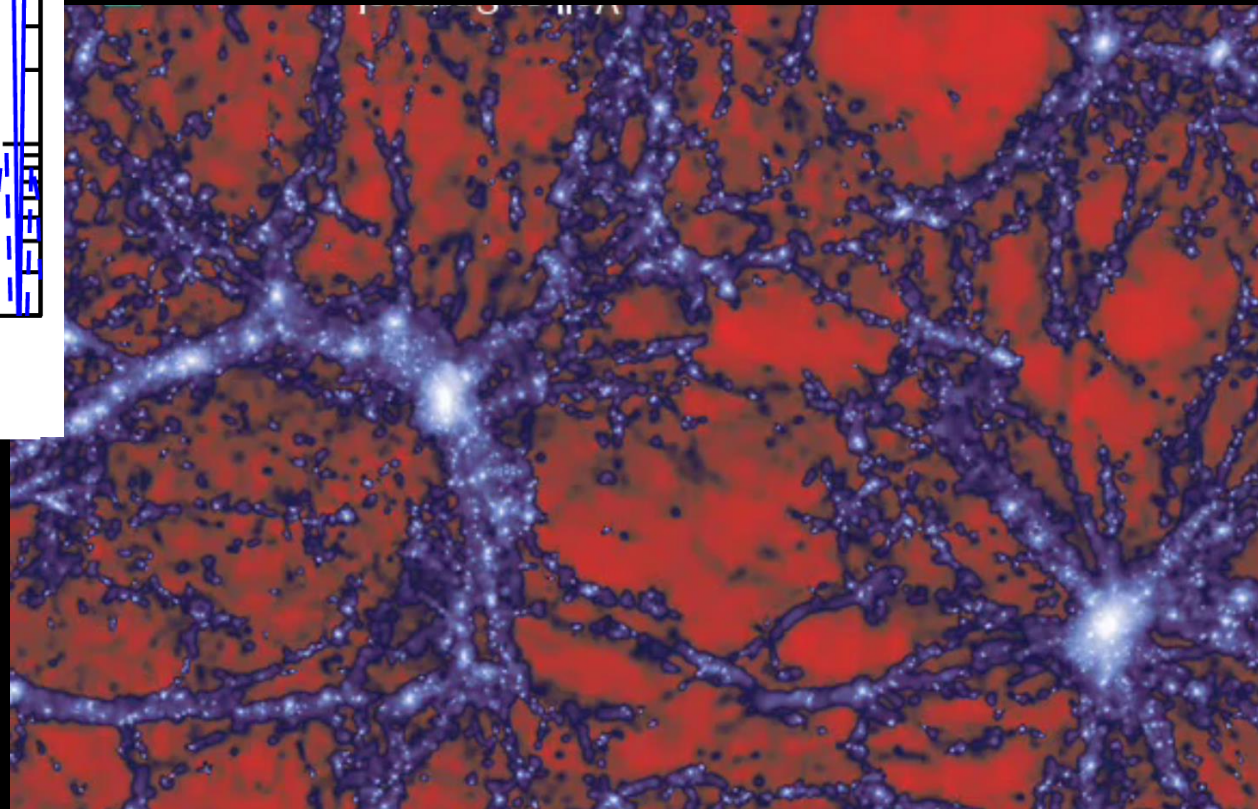


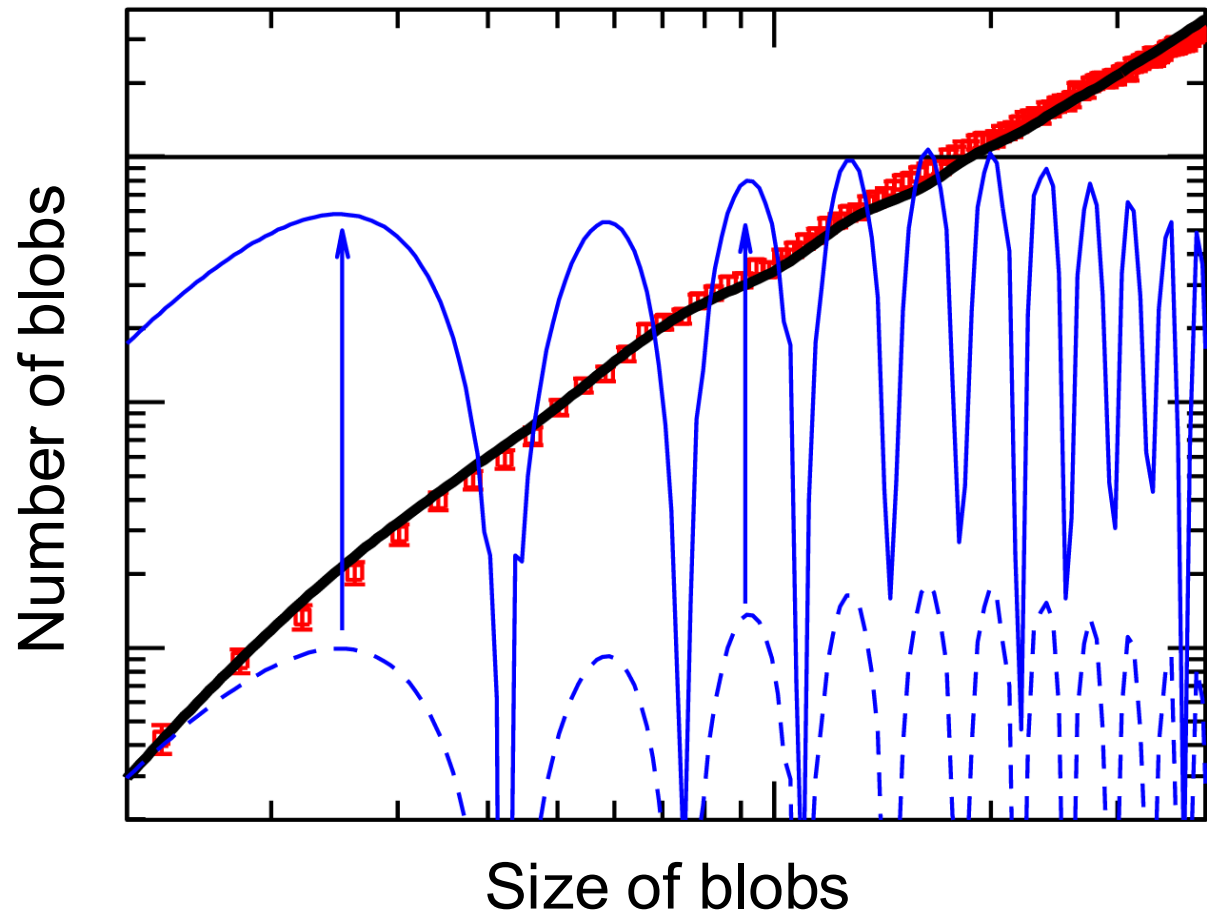


**Patterns don't look
quite right**



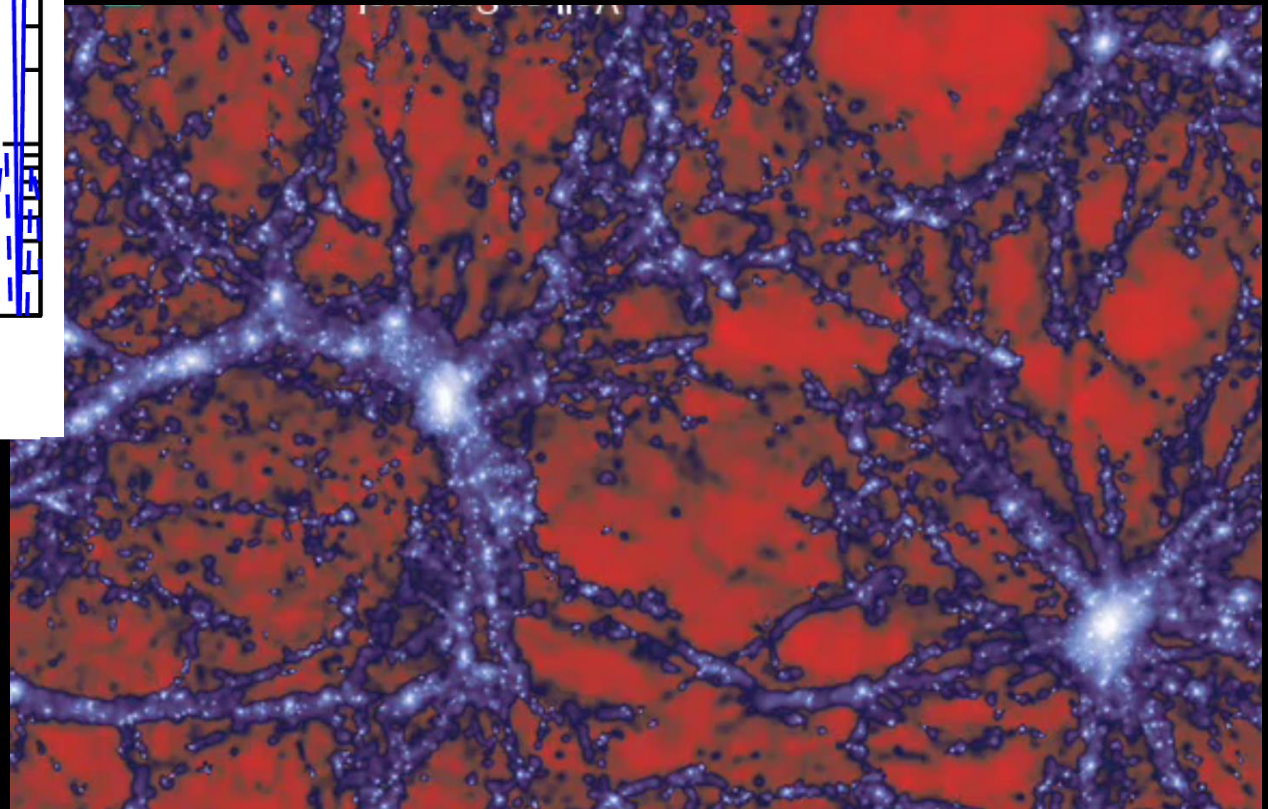
**Patterns don't look
quite right**





Red is real data
Blue is what you get
with just hydrogen

Patterns don't look
quite right





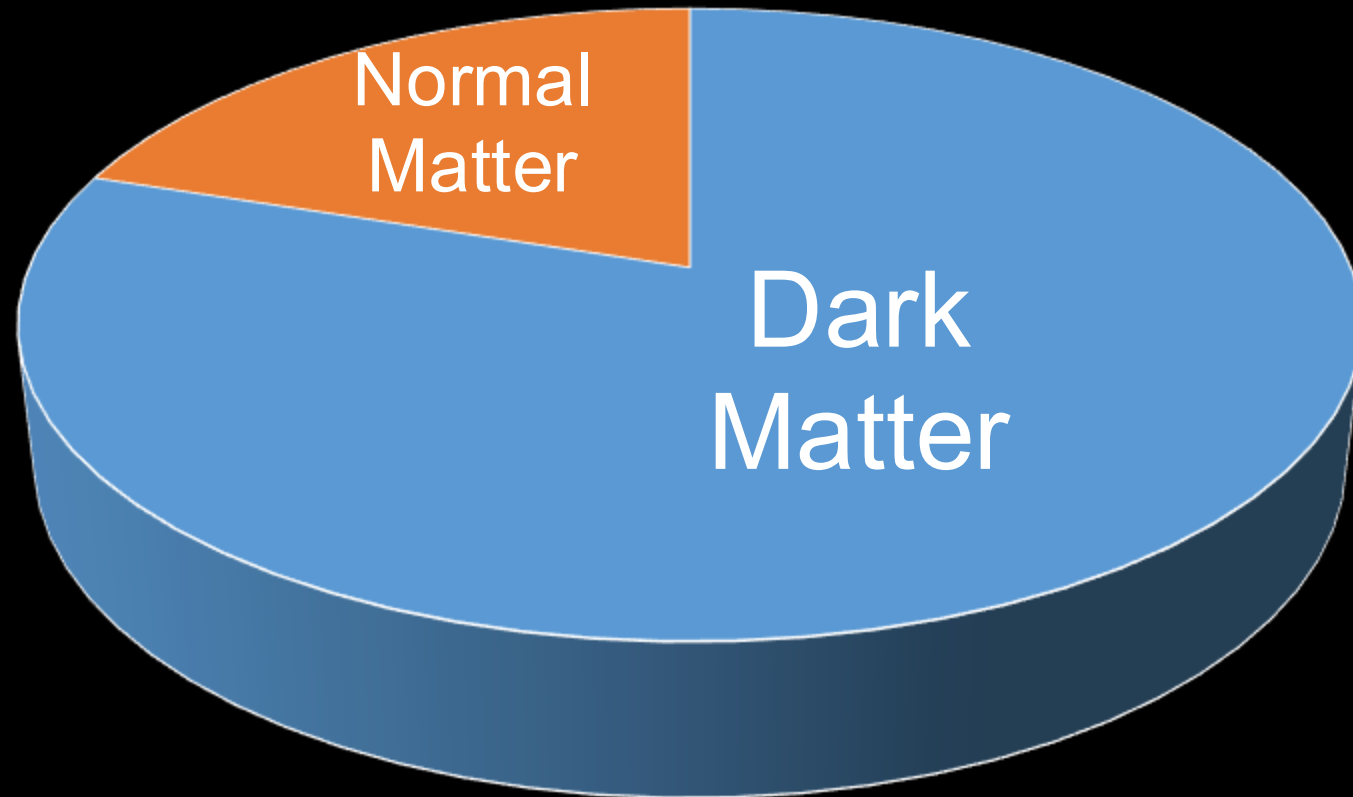
What is it?

Dark

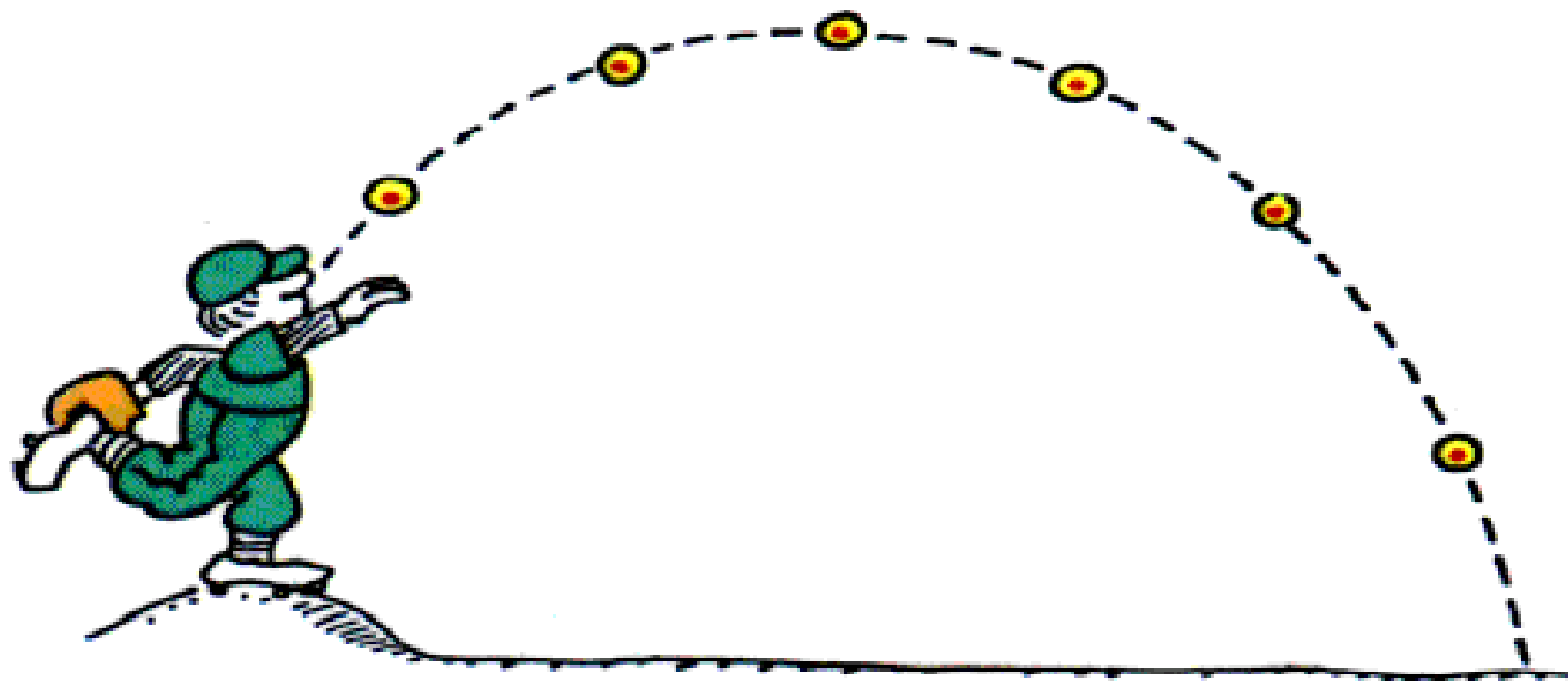
Dark Matter

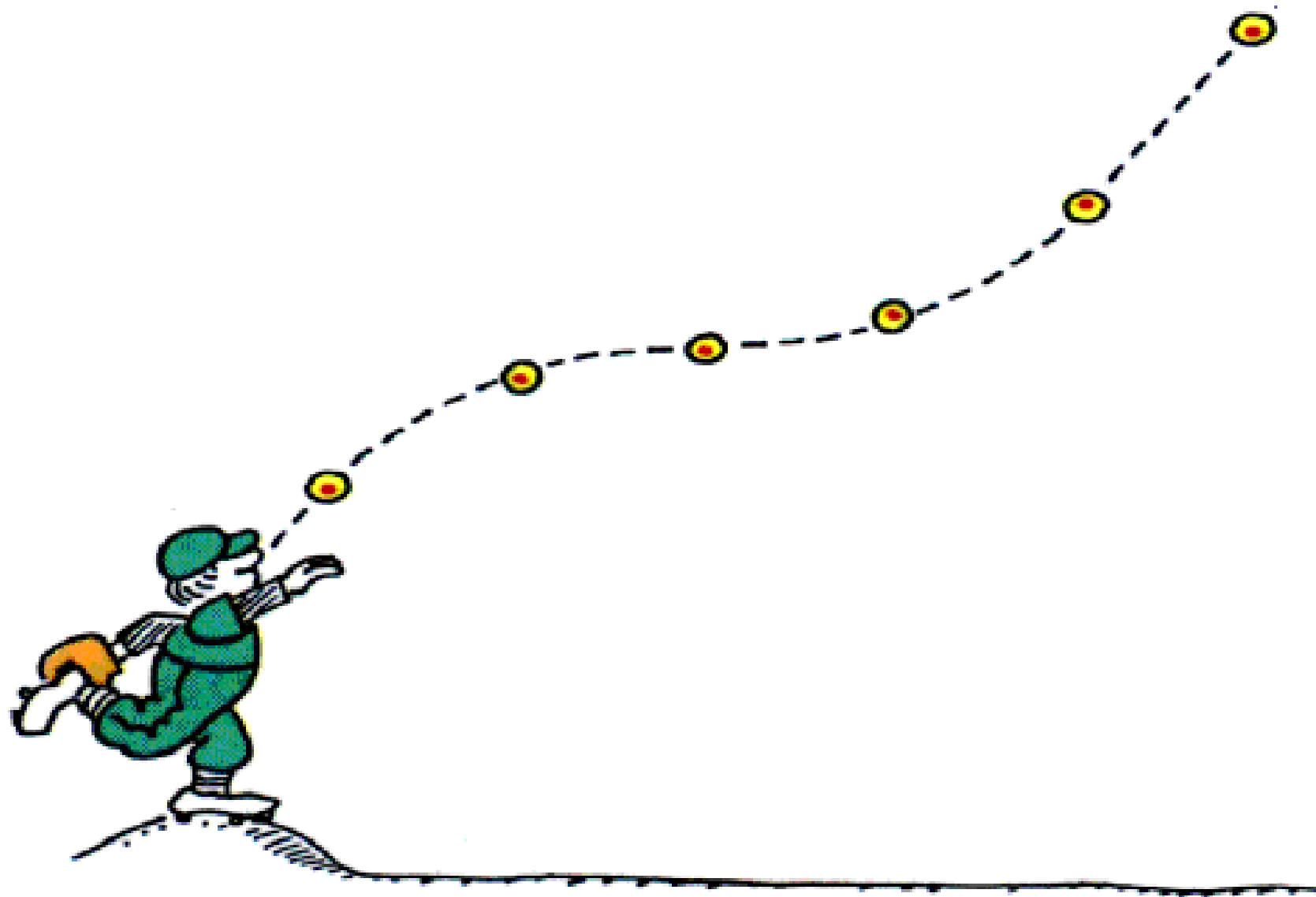


There's a lot of it!



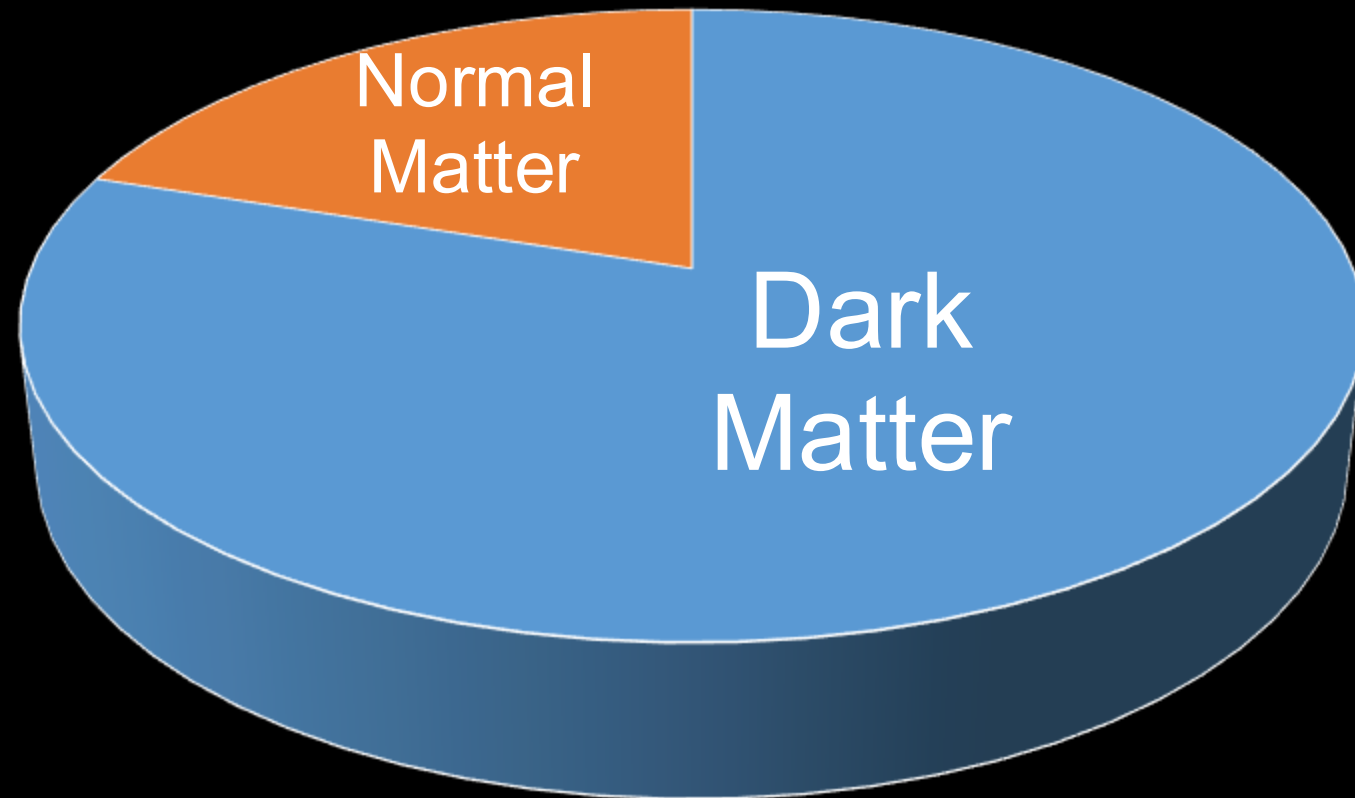




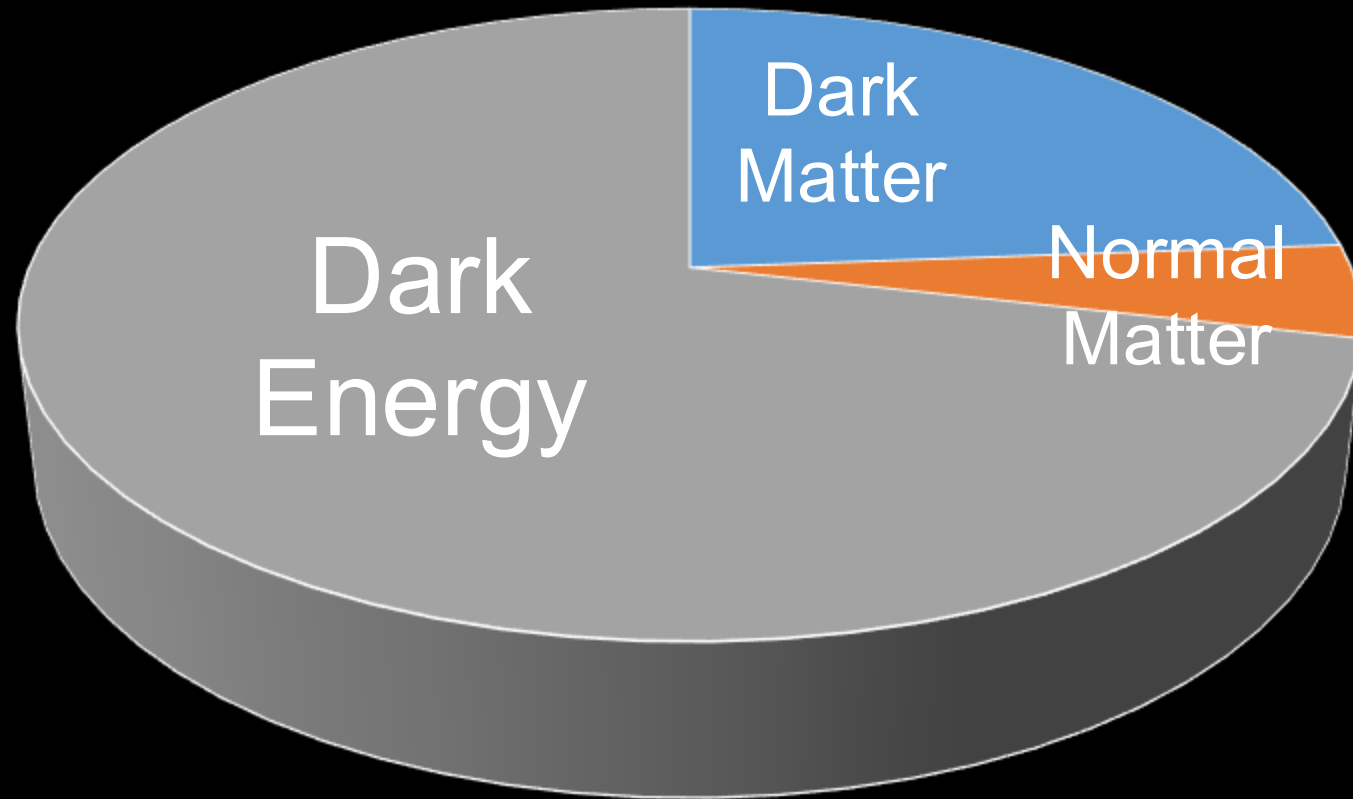


Dark

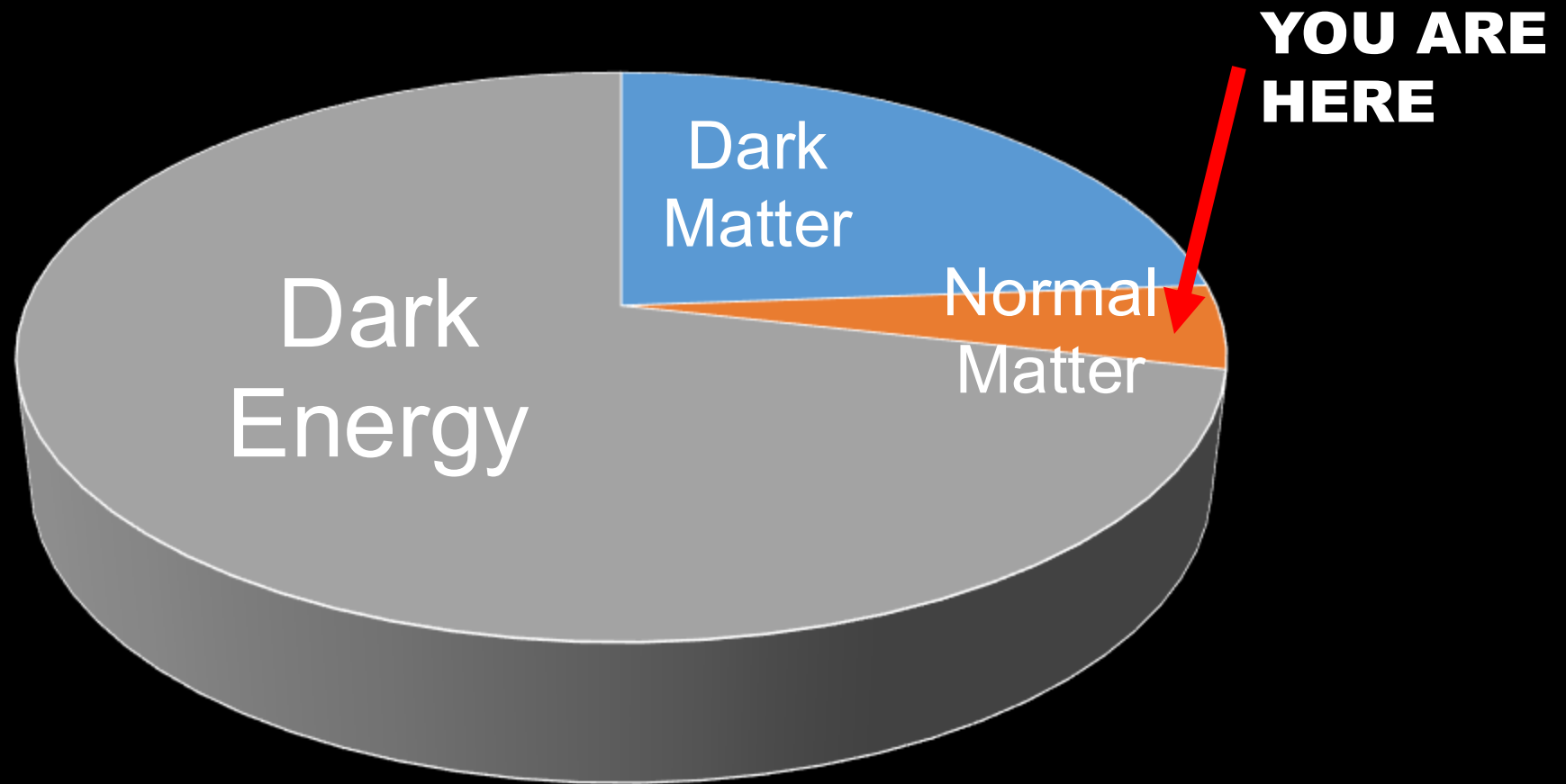
Dark Energy

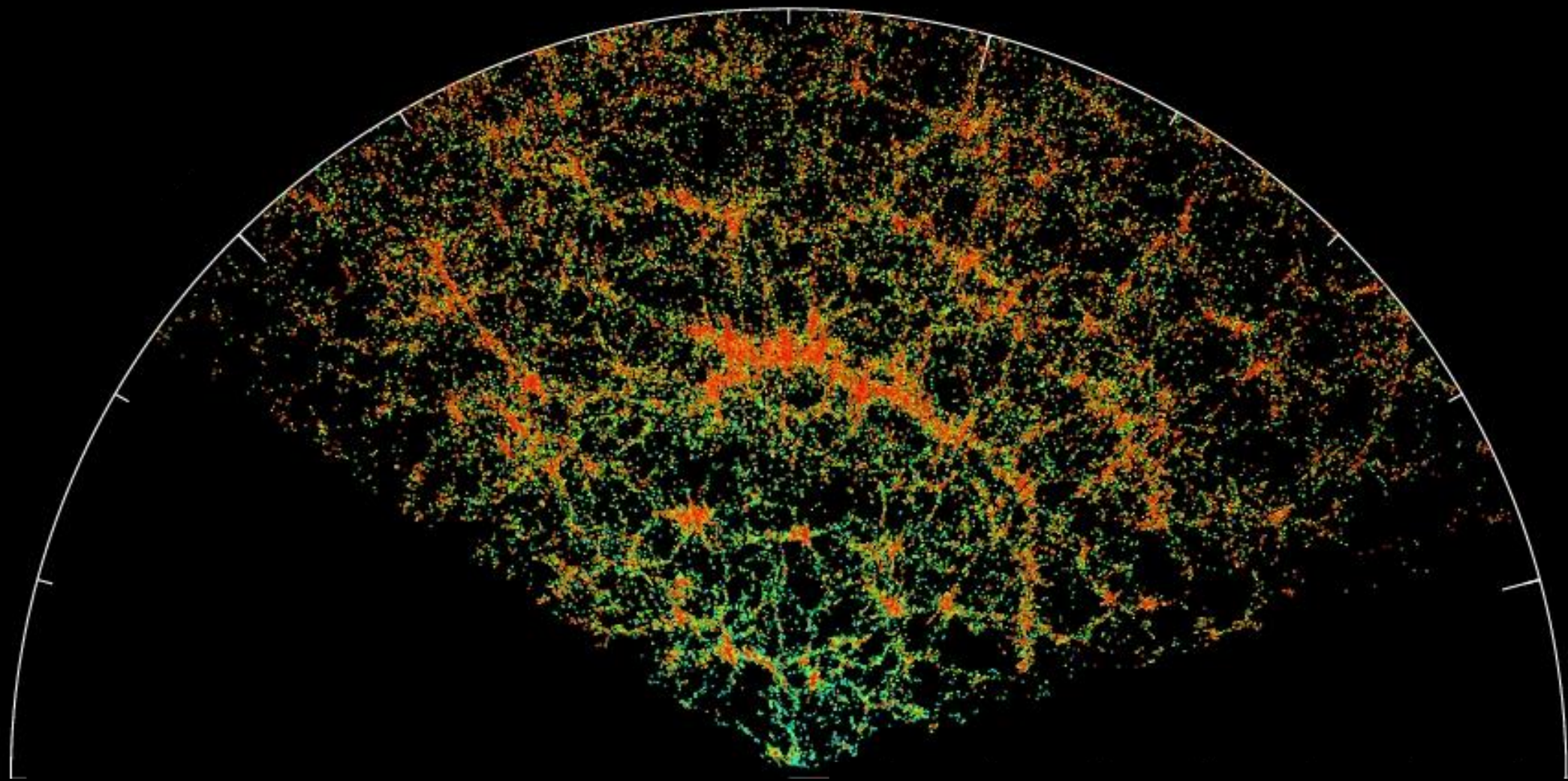


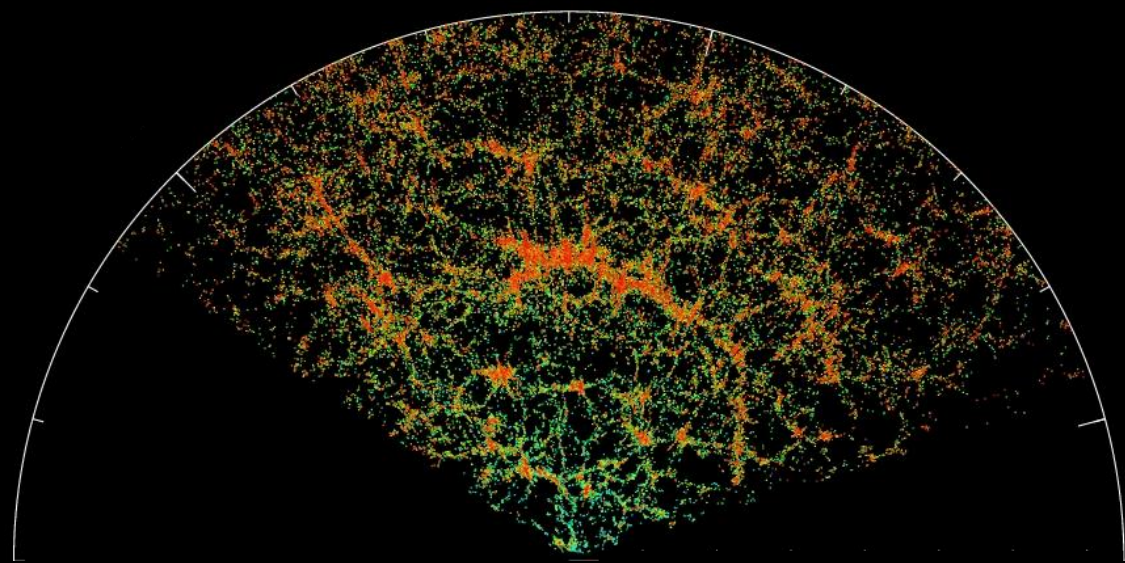
There's even more of it!

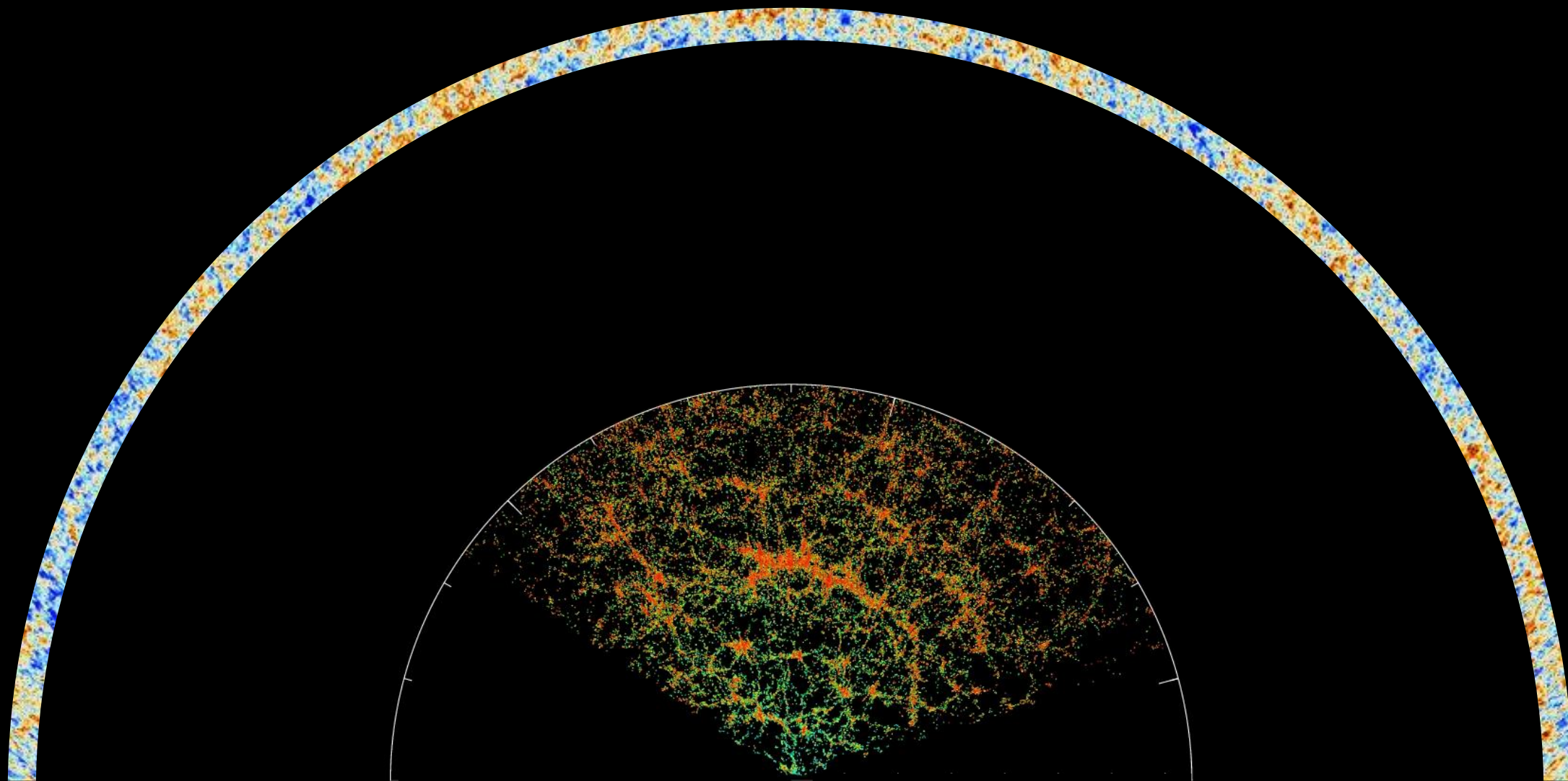


There's even more of it!

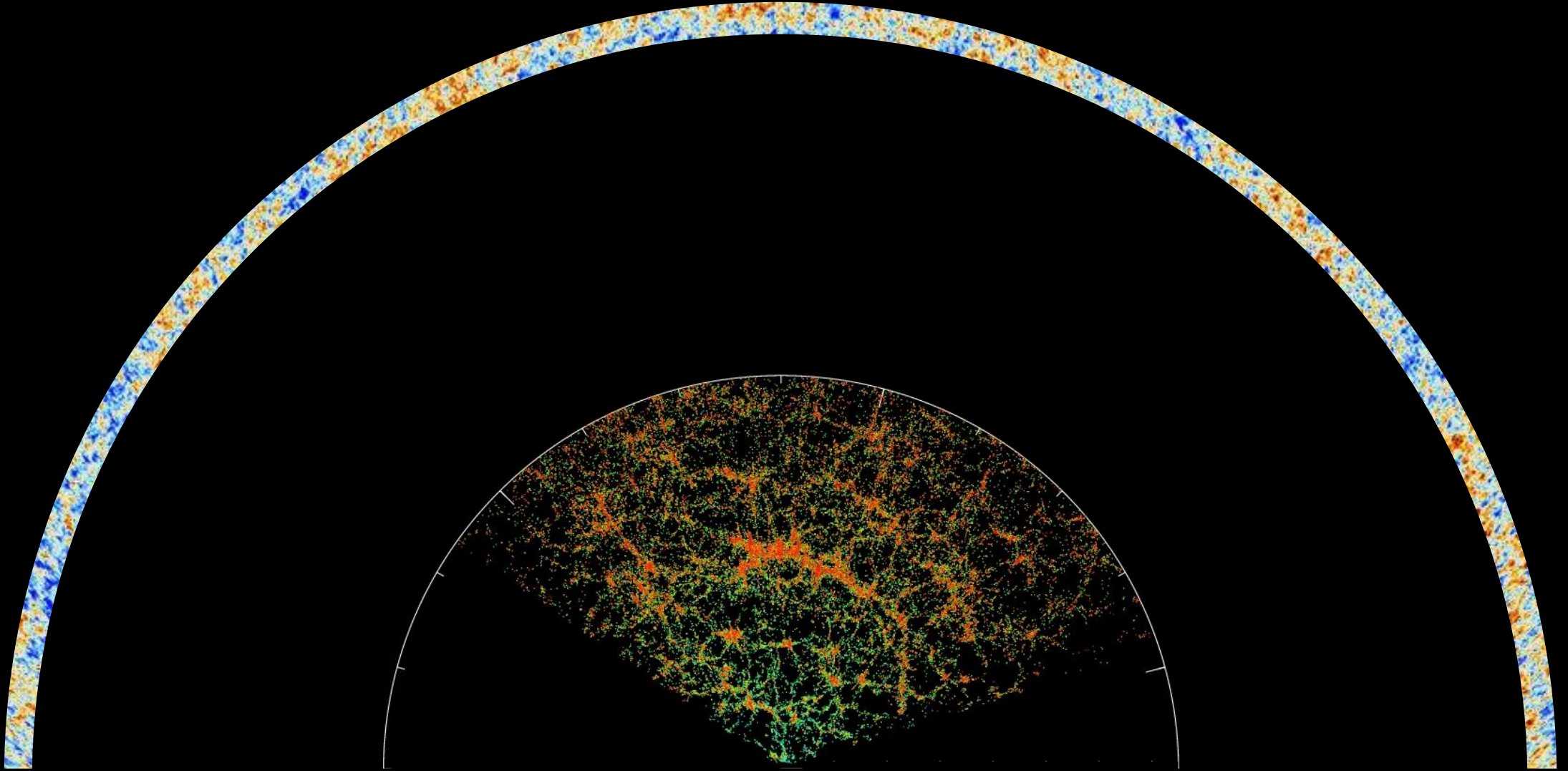




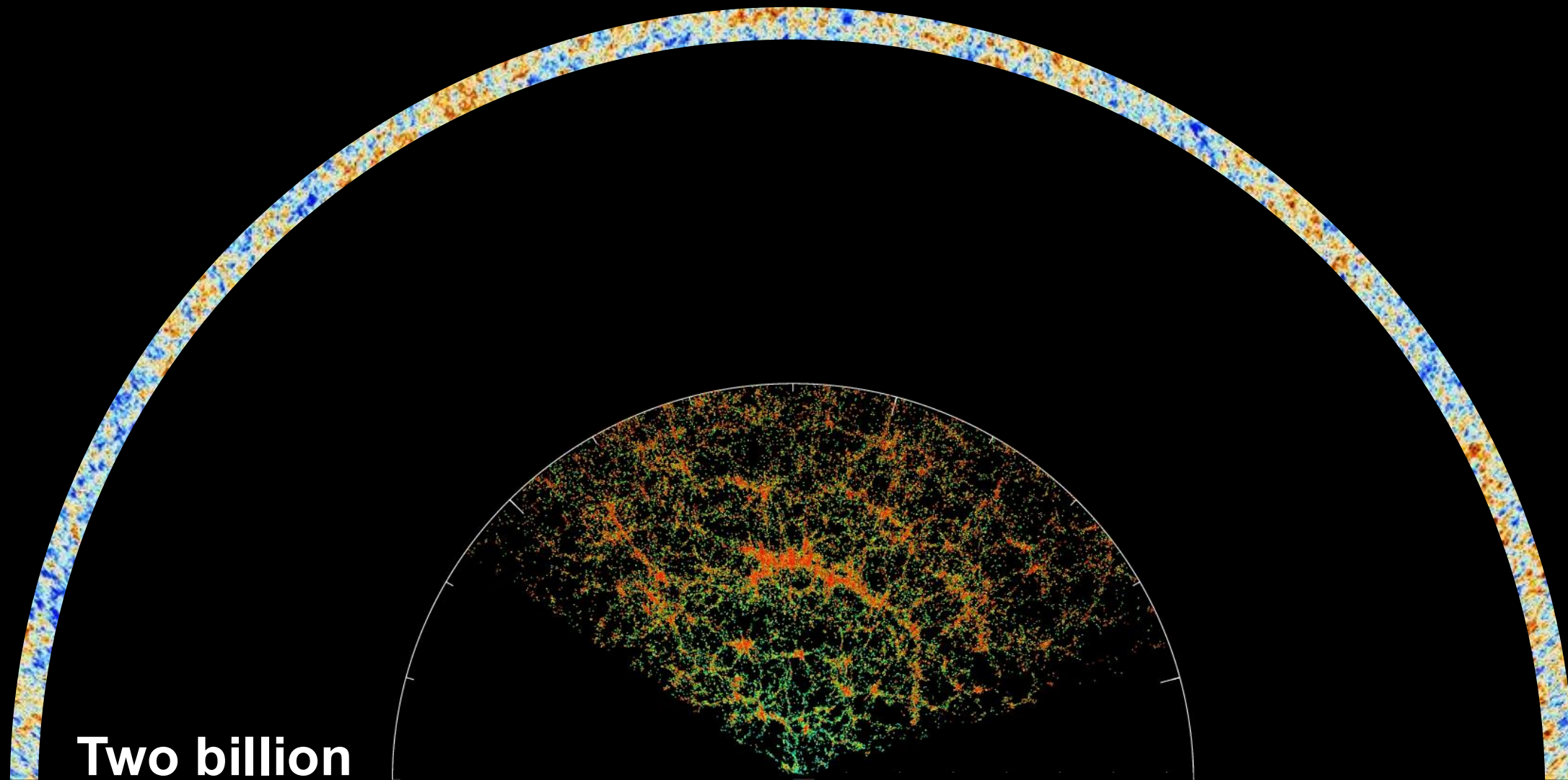




There's a gap here



There's a gap here

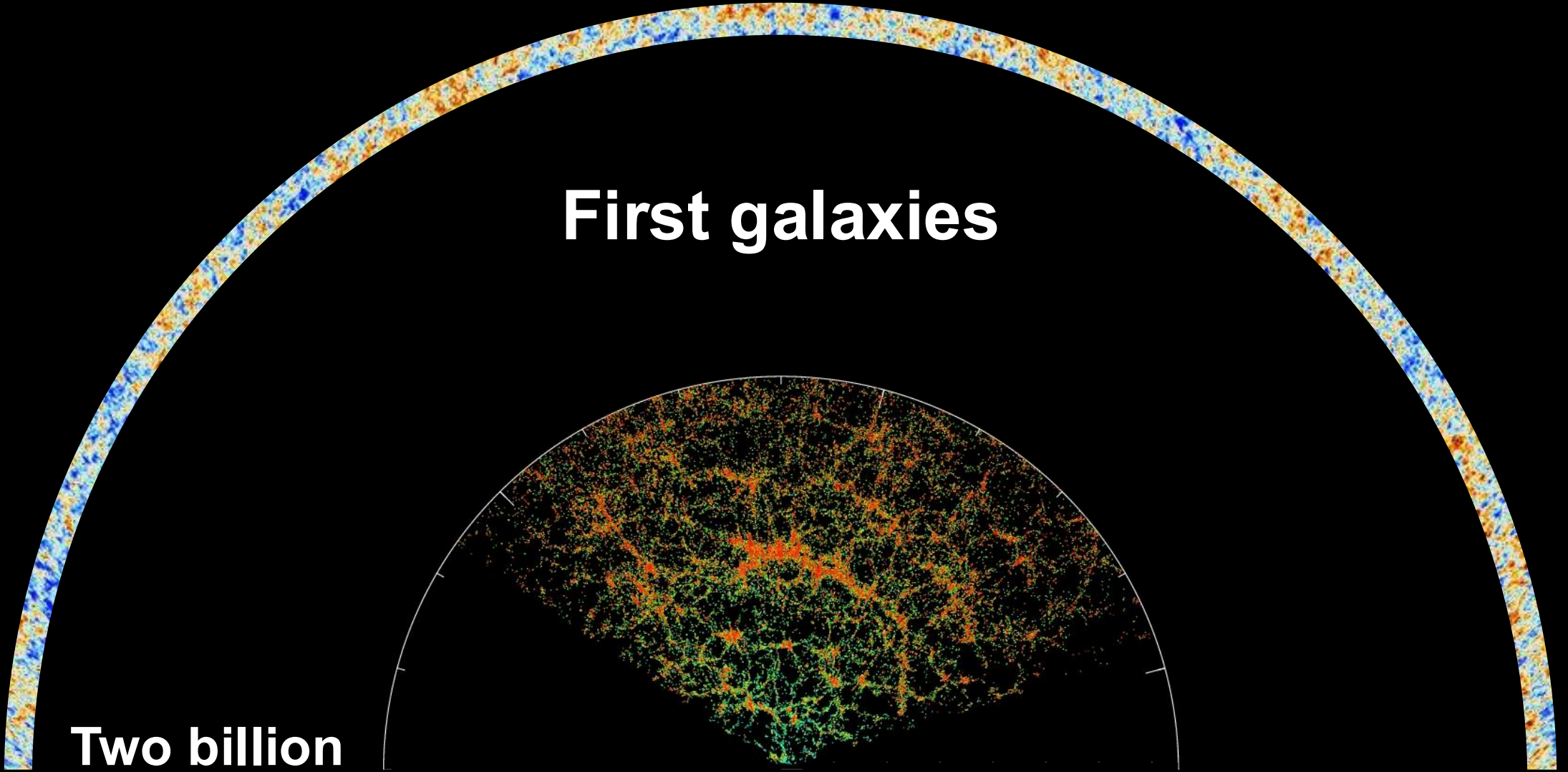


**Two billion
years**

There's a gap here

First galaxies

**Two billion
years**

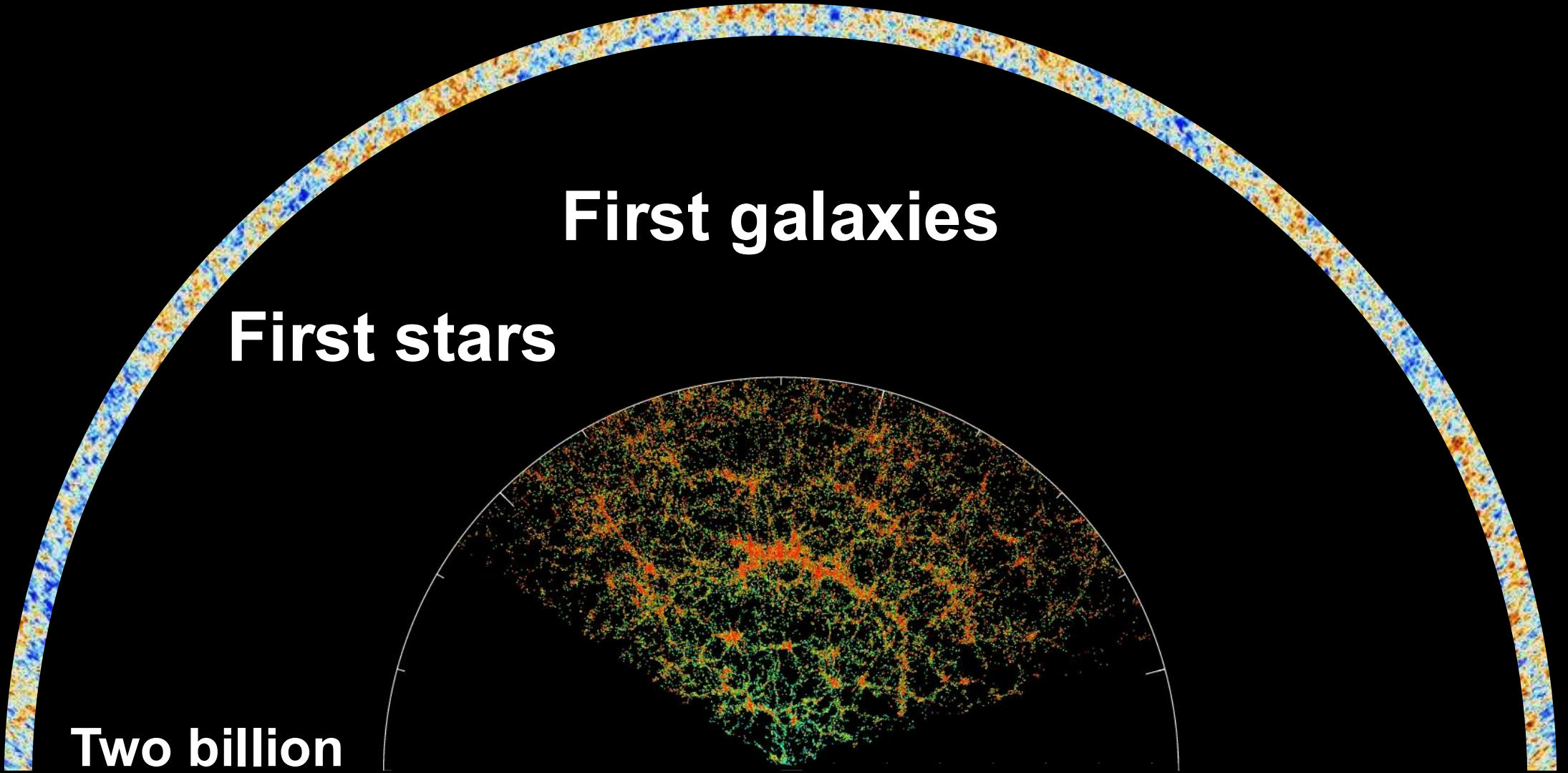


There's a gap here

First galaxies

First stars

**Two billion
years**

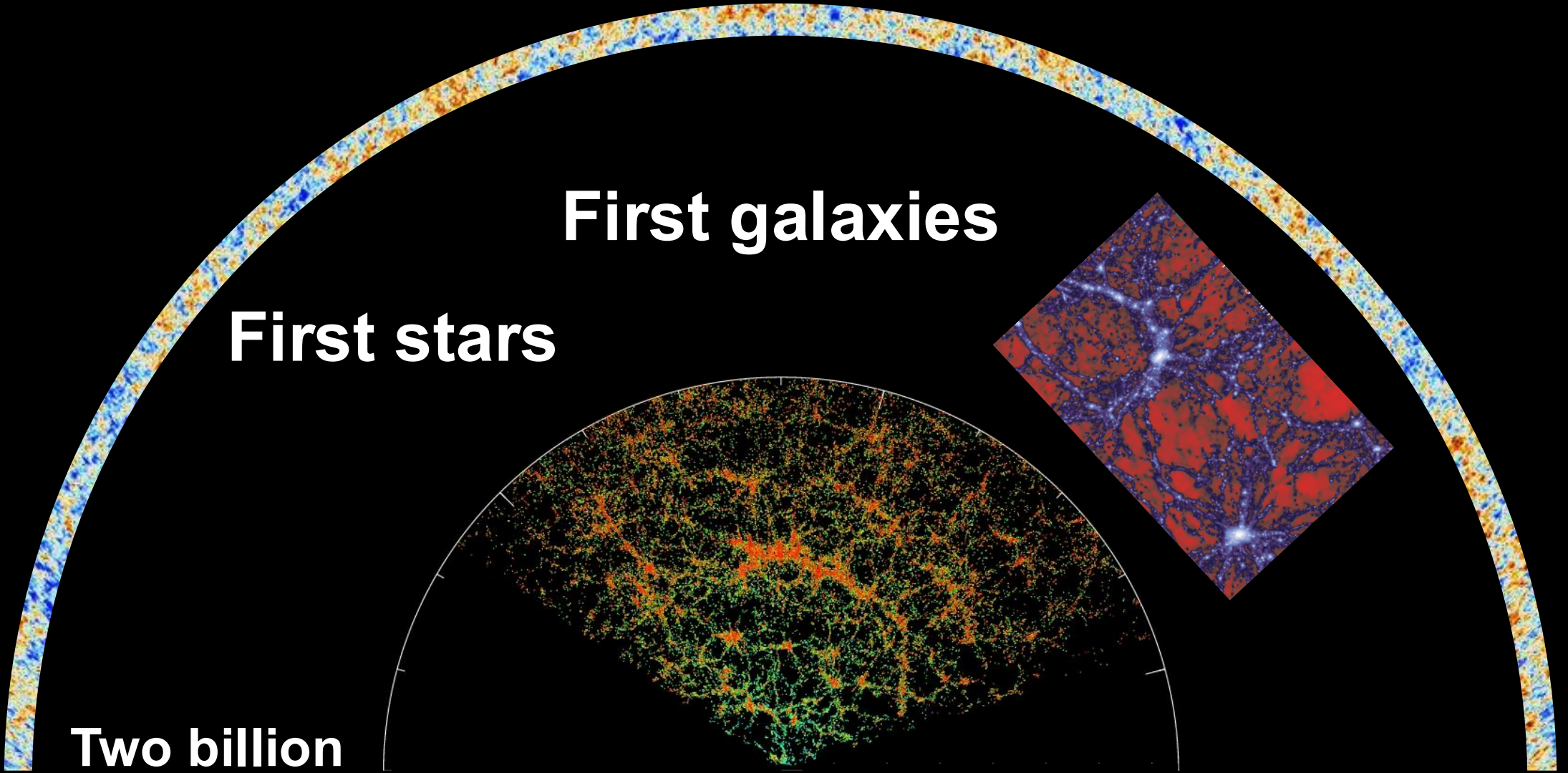


There's a gap here

First galaxies

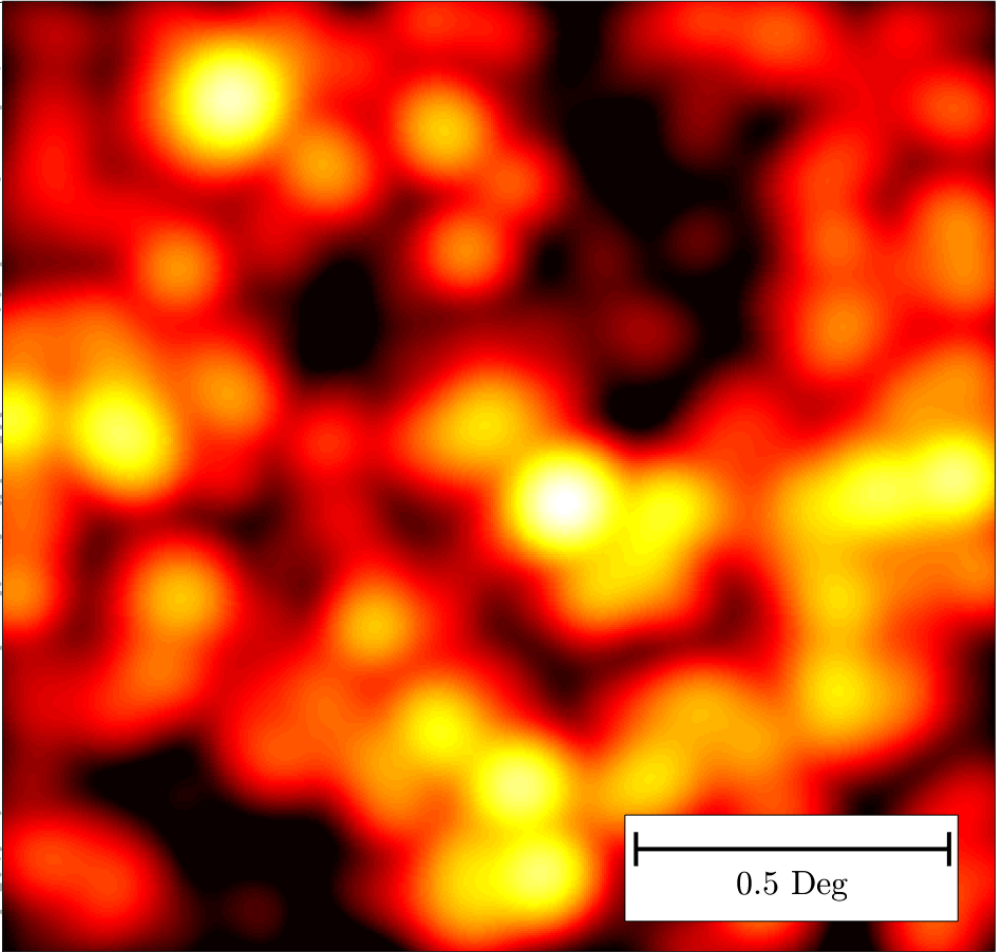
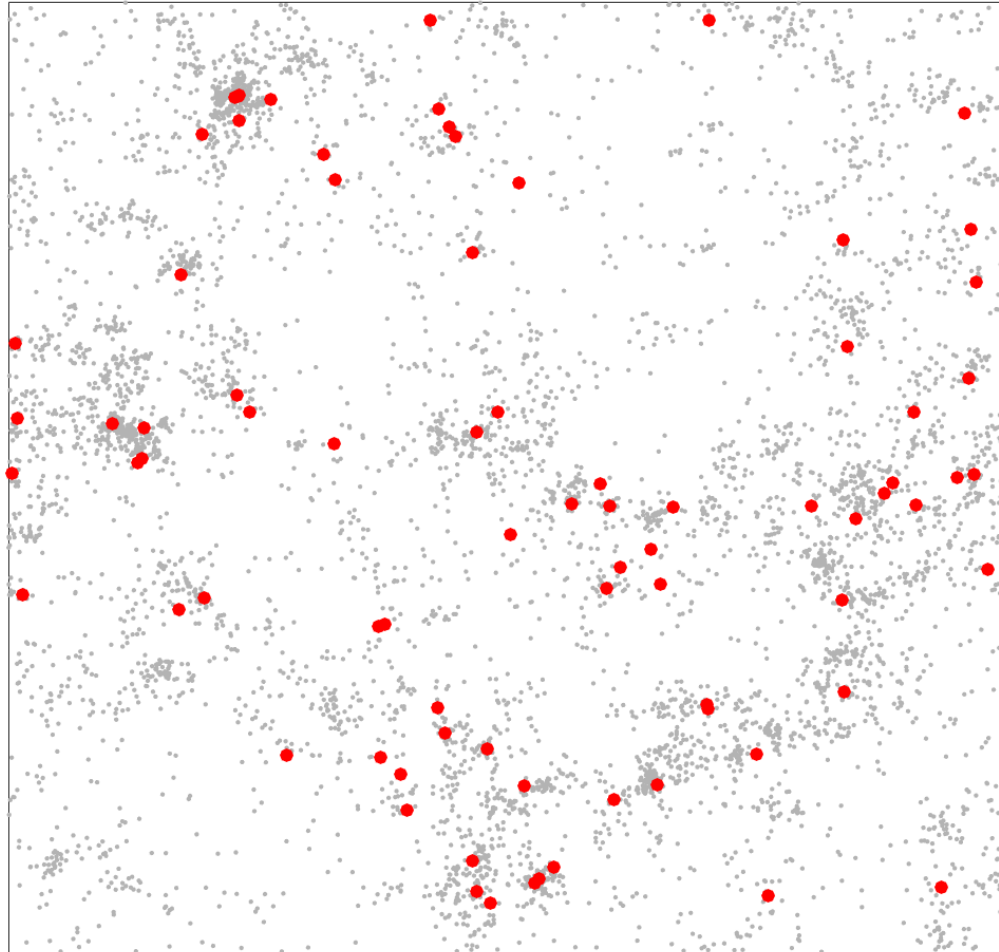
First stars

**Two billion
years**

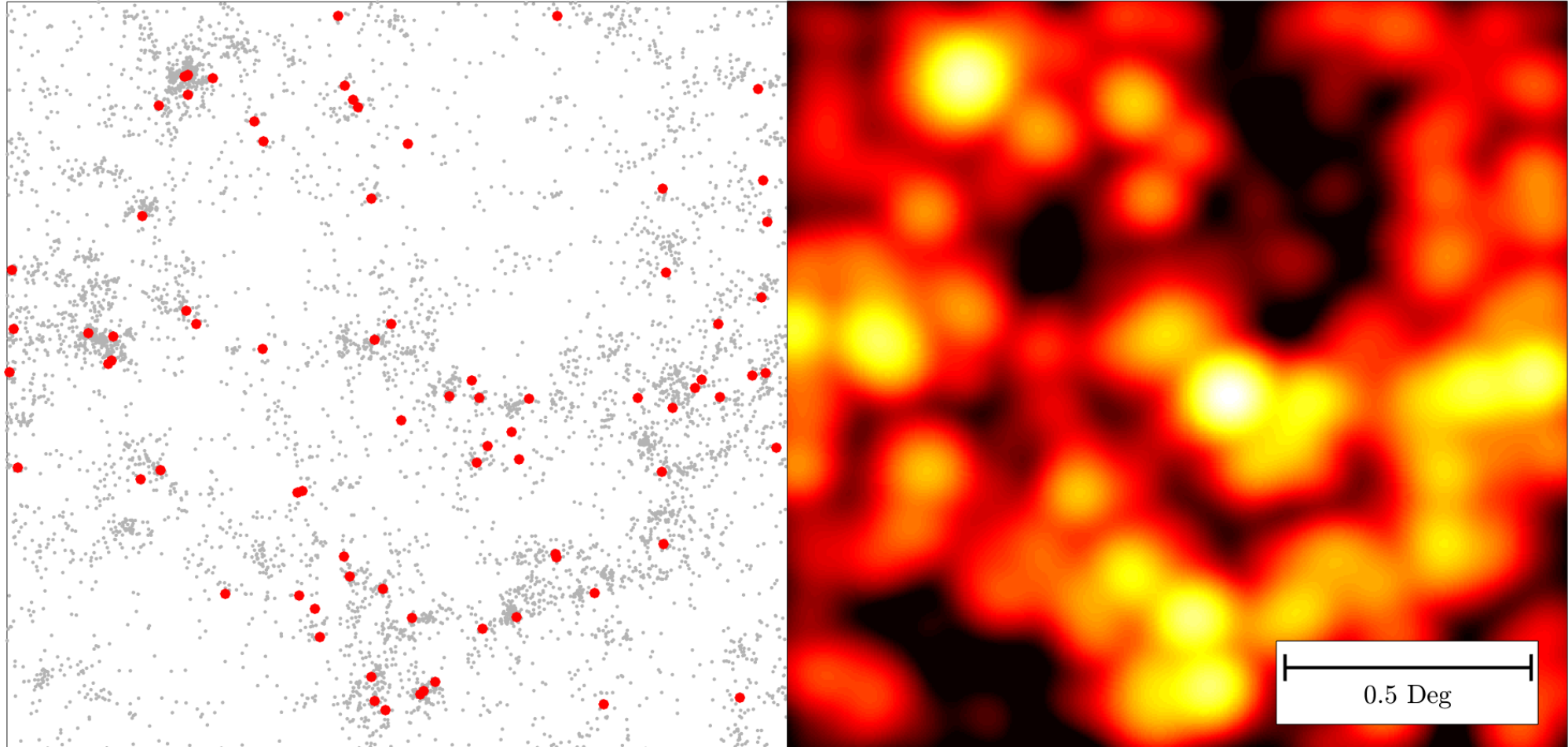


The part that I work on

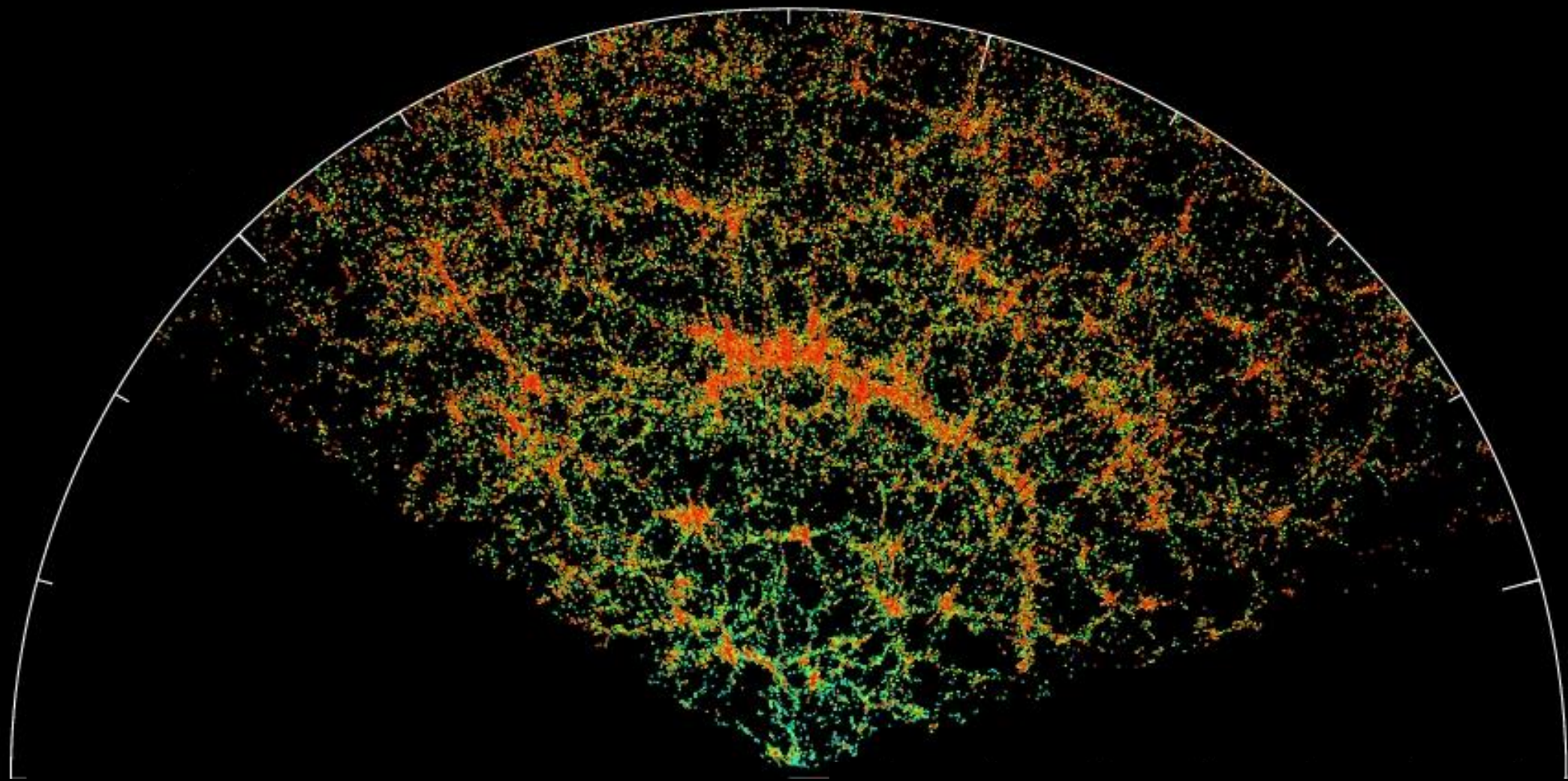
Galaxies



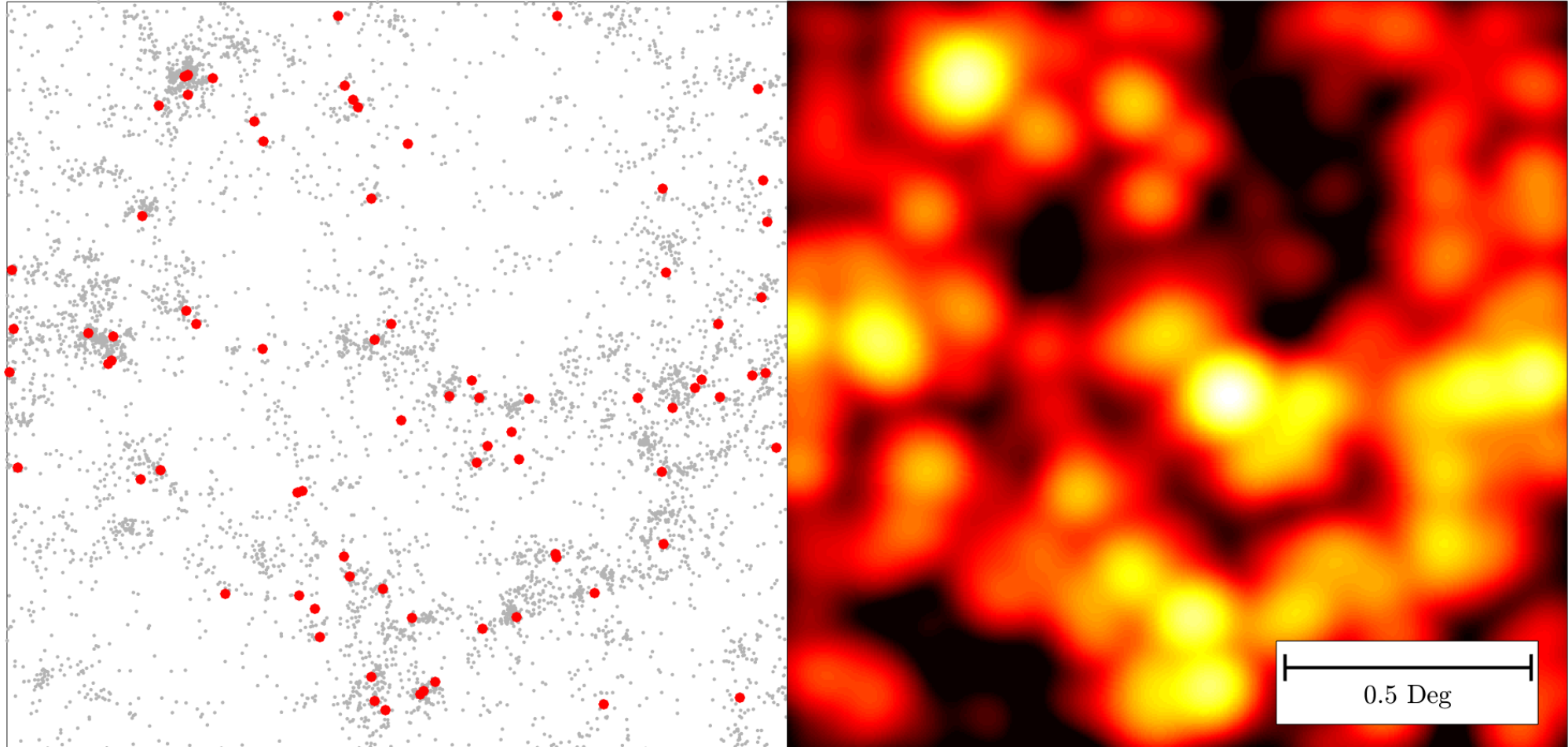
Galaxies



Smeared-out galaxies

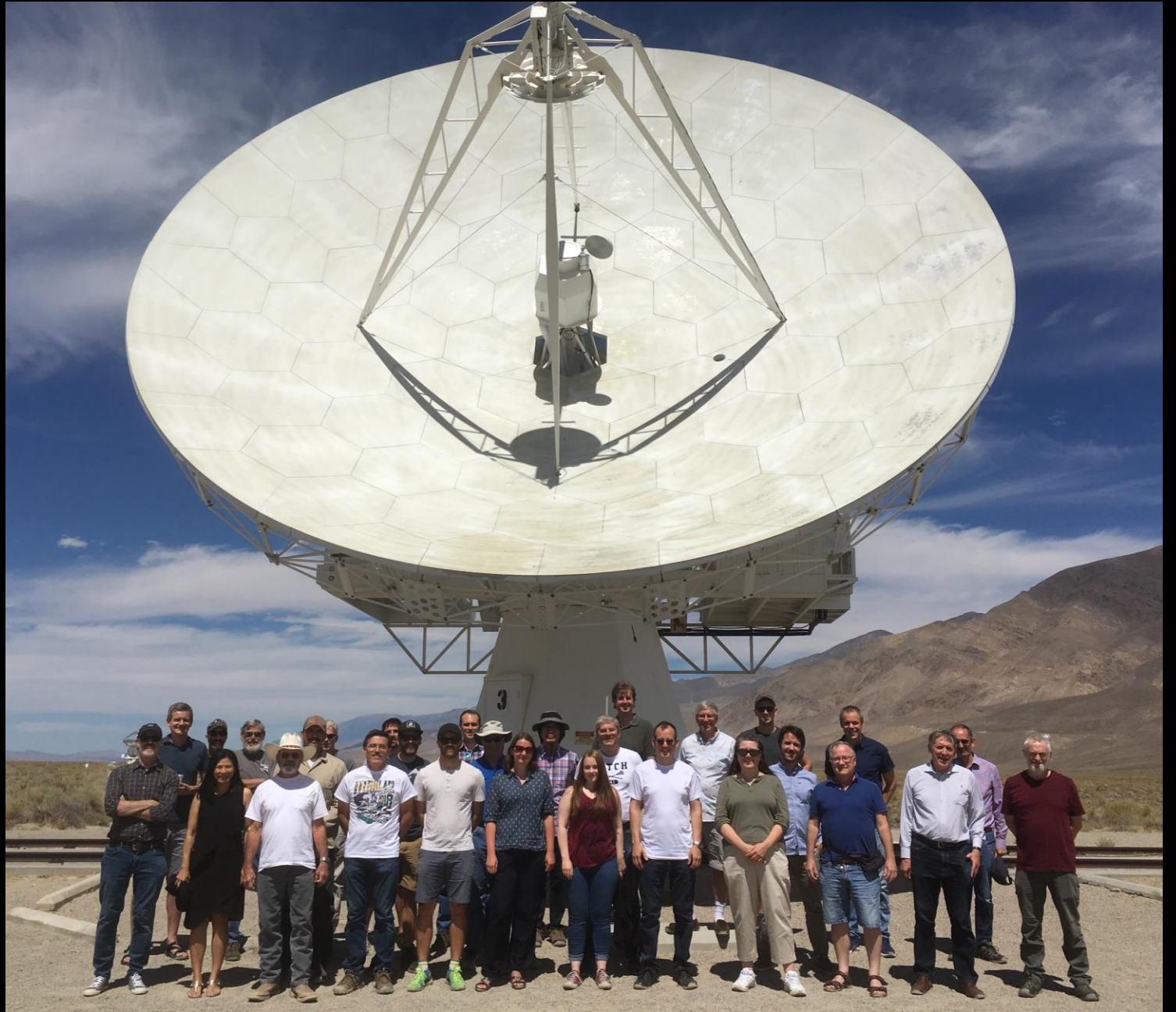


Lots of time, big telescope



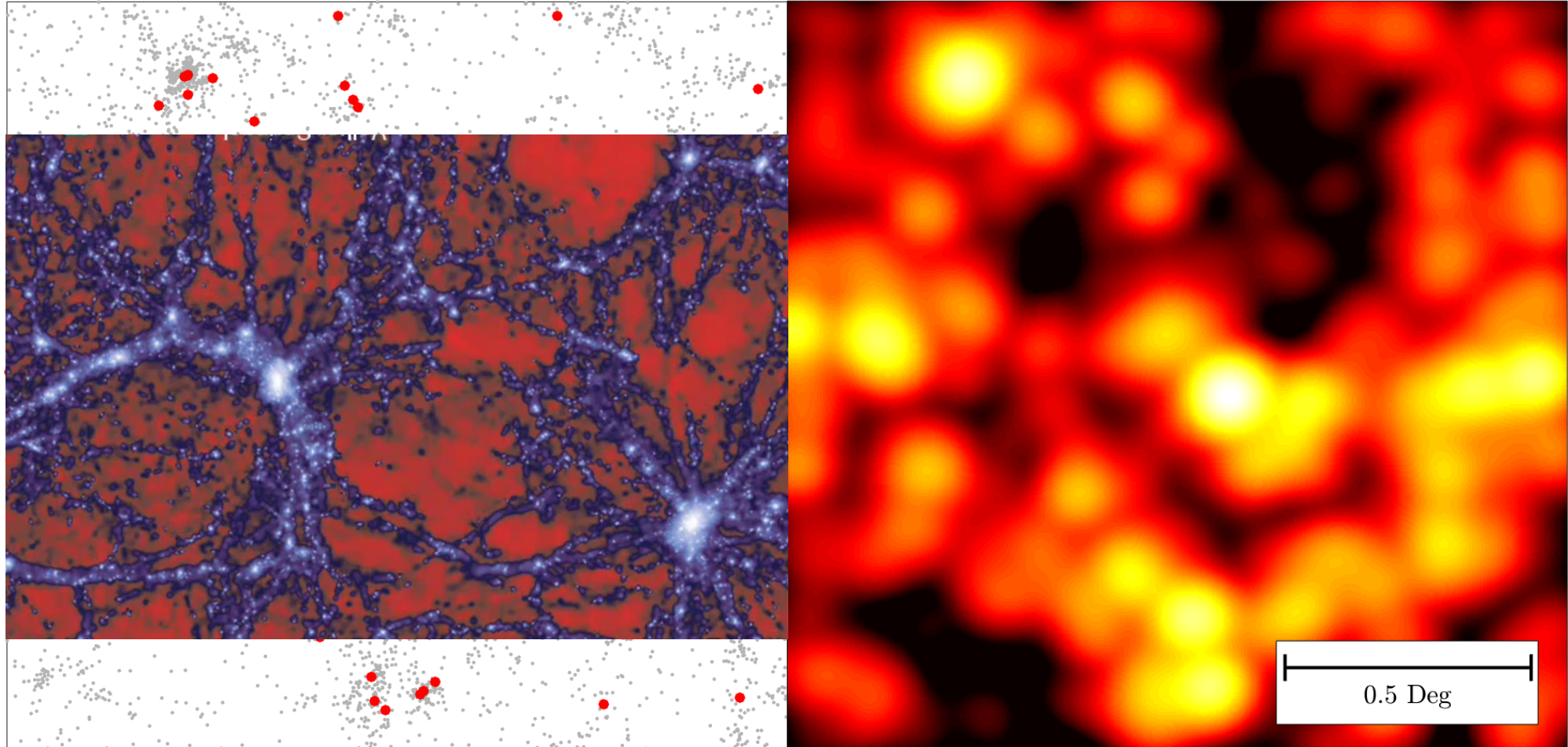
Less time, less-big telescope

COMAP

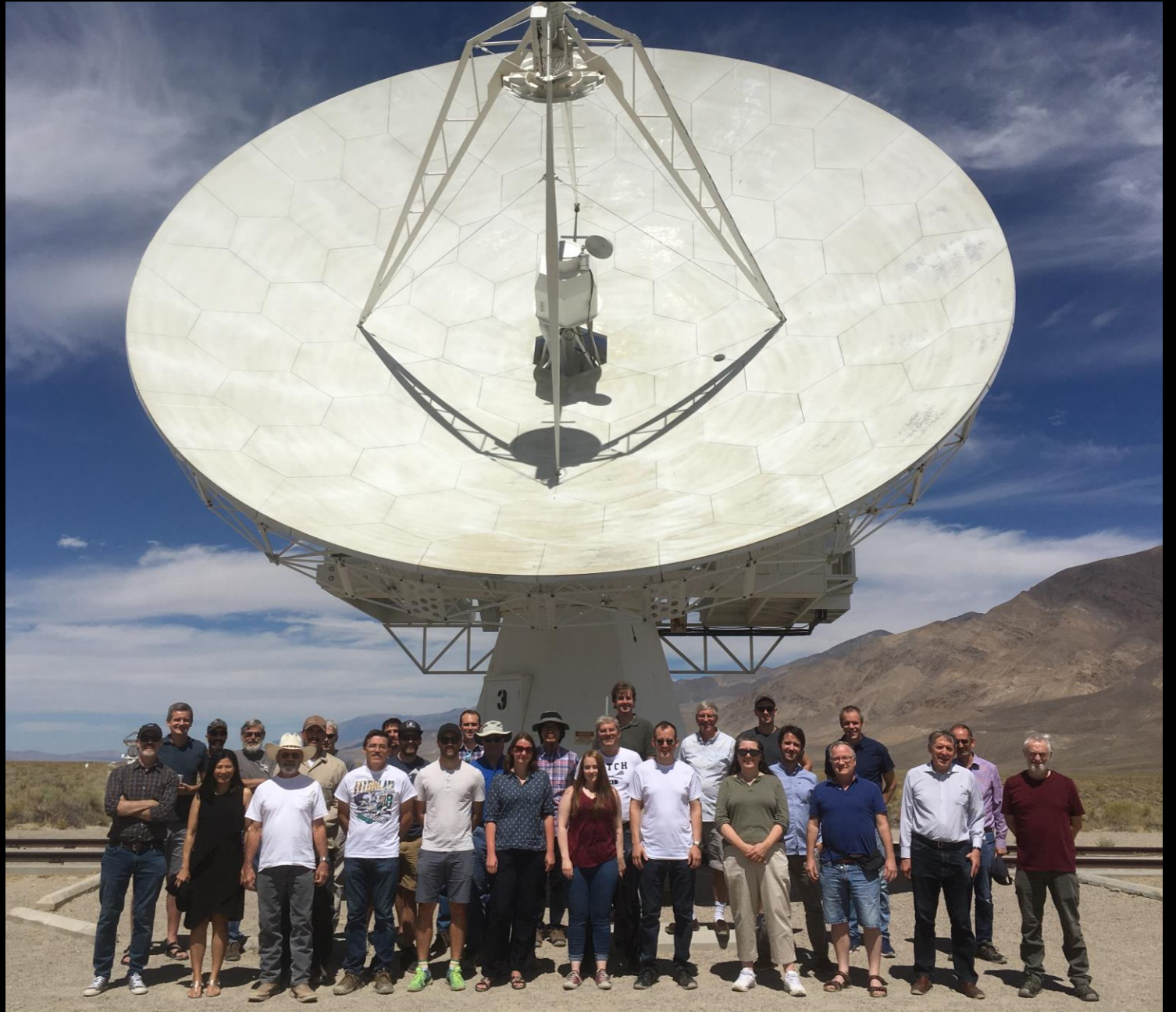


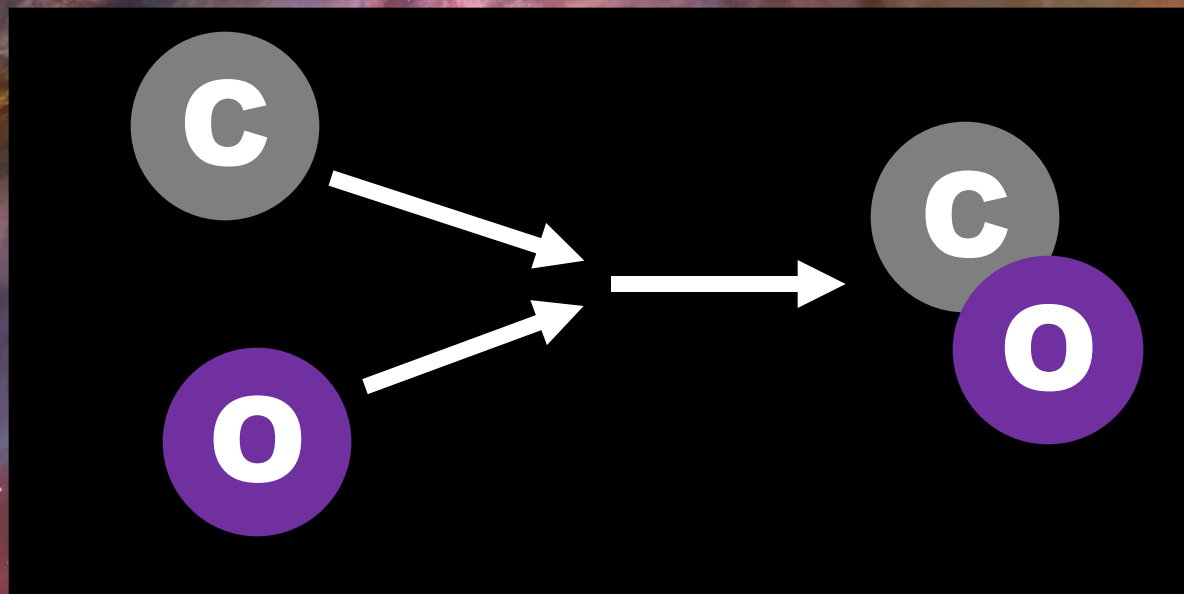
**So what can we do
with this thing?**

Shape of blobs = Cosmic Web



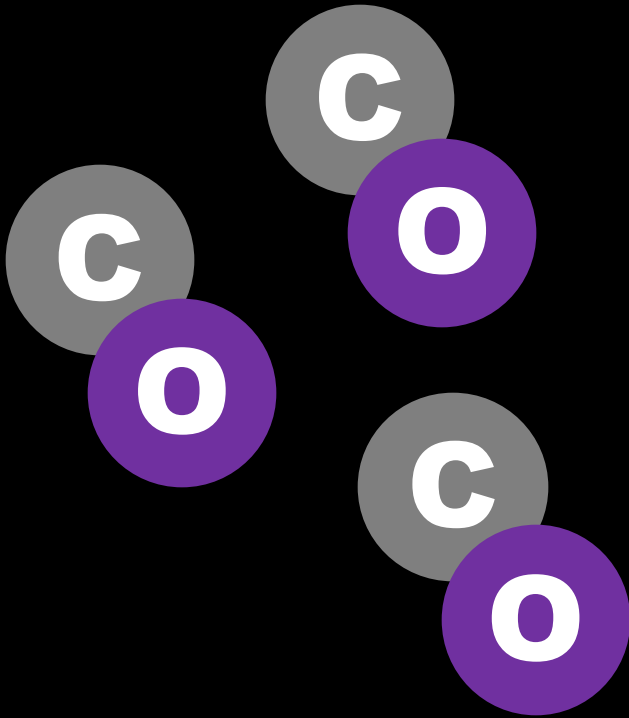
COMAP



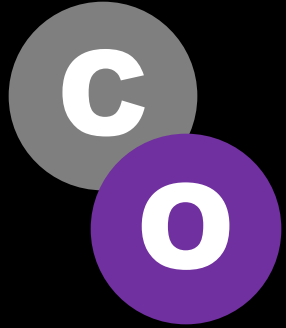


Molecules!

**Measure how much CO
there is**



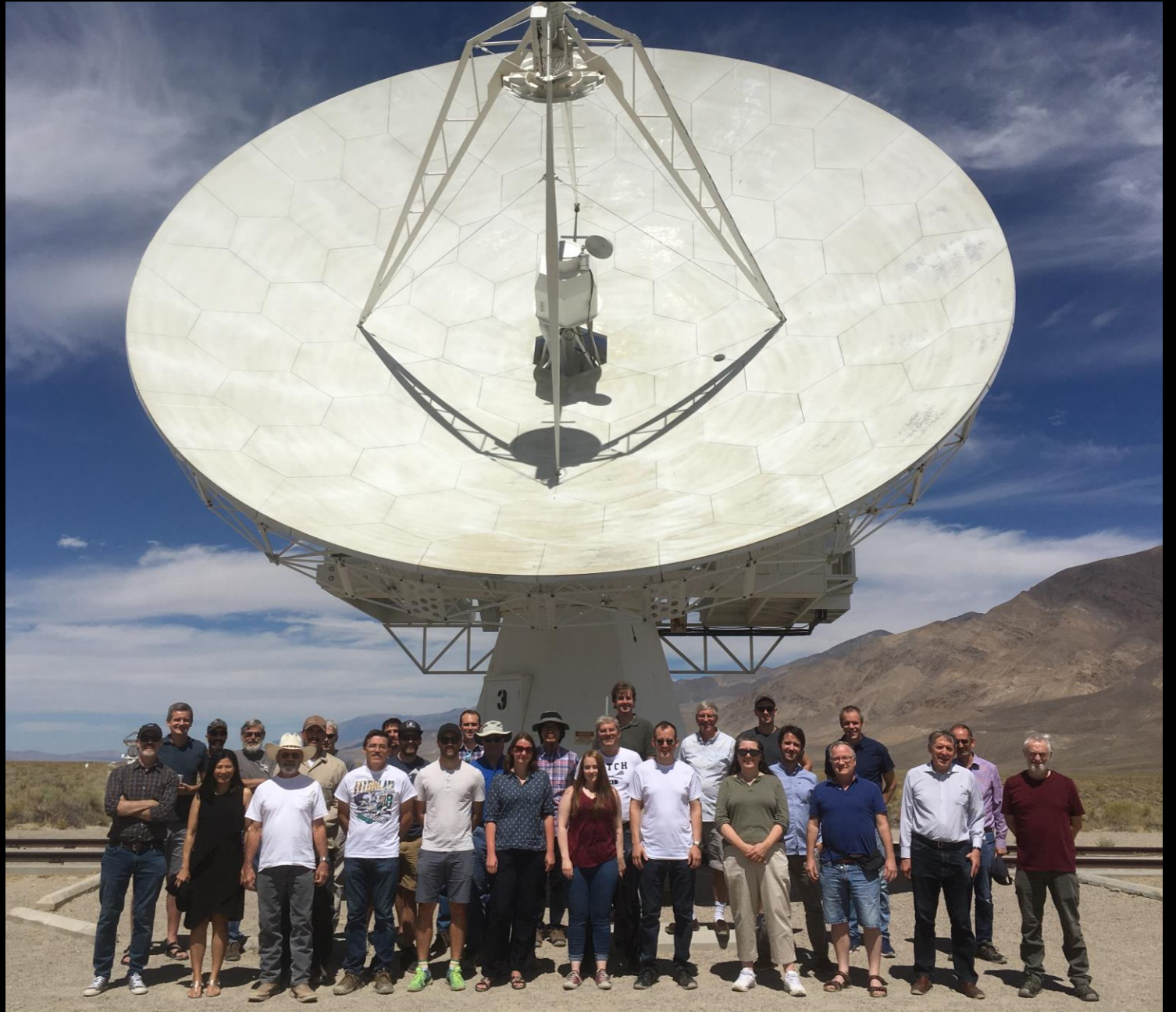
**See how many stars are
being born**



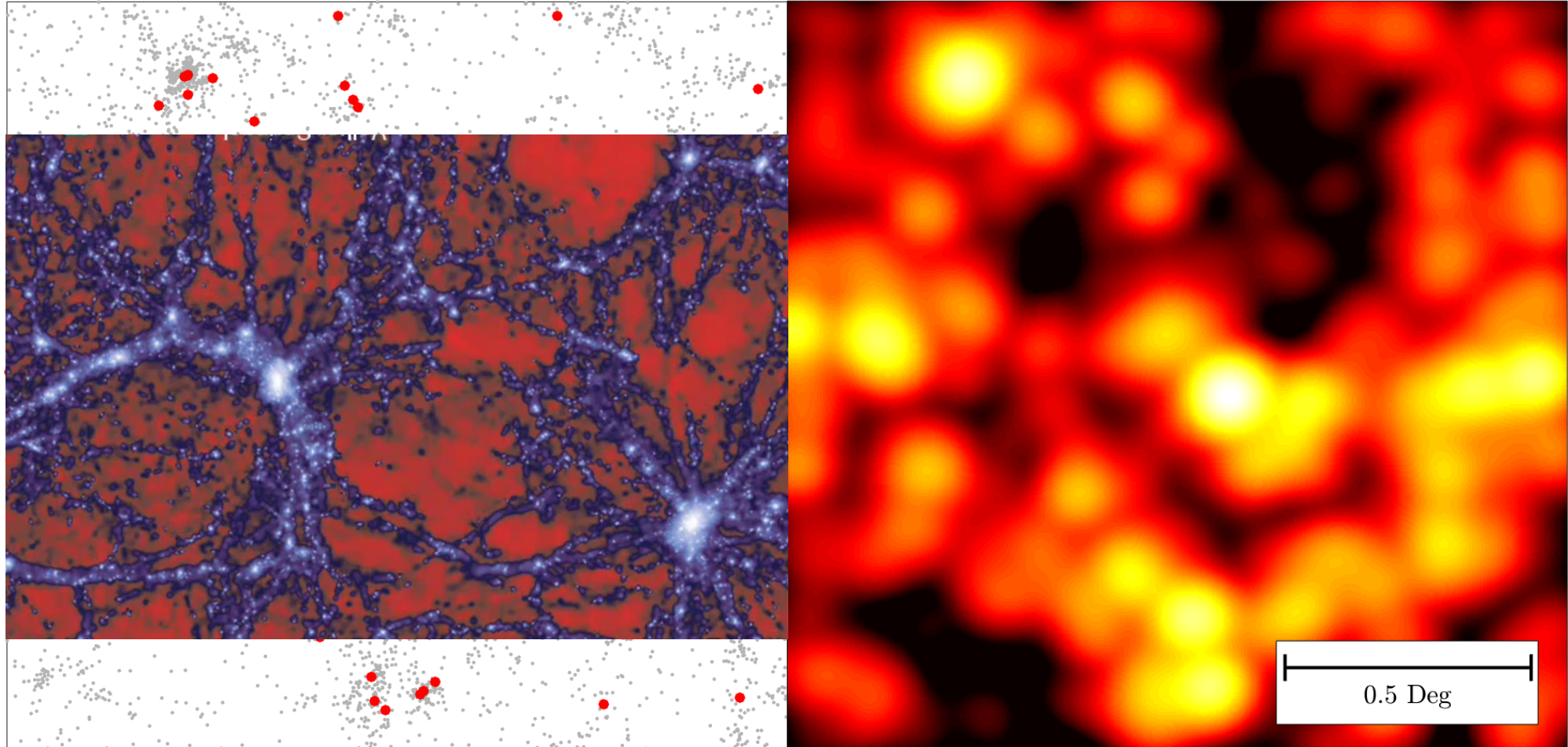
**Molecules give off specific
radio frequencies**



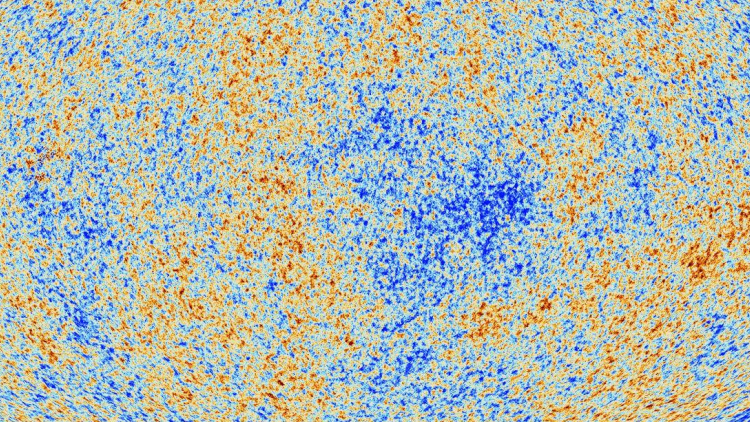
COMAP

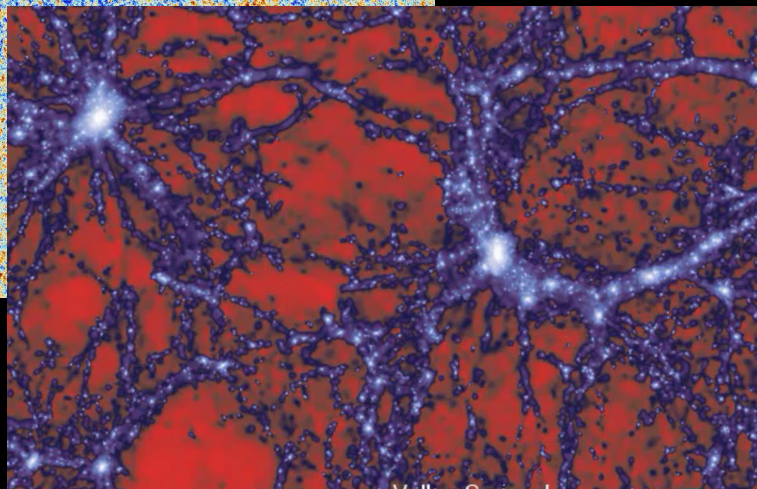
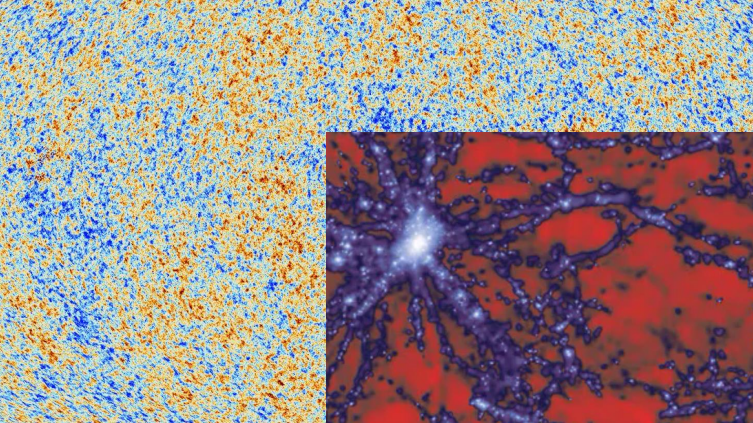


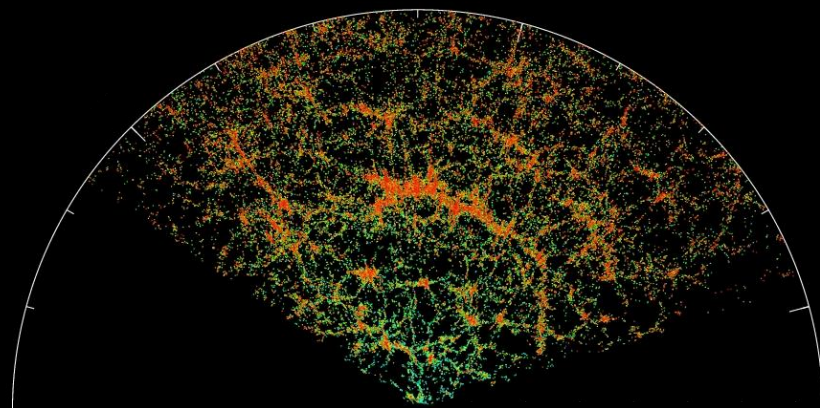
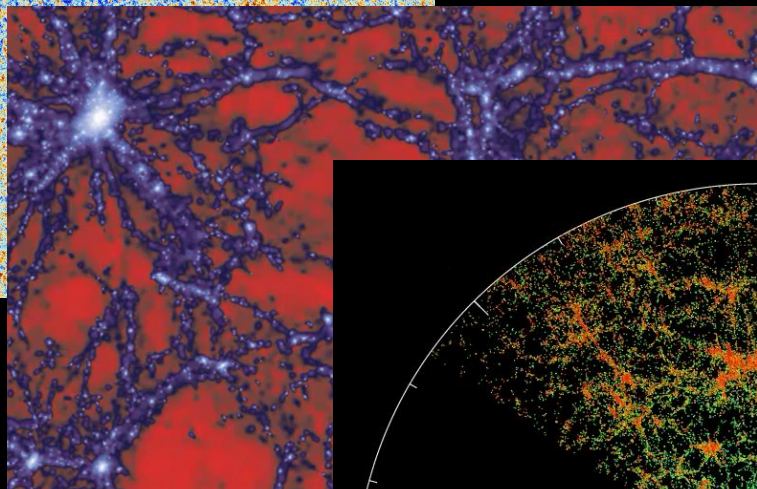
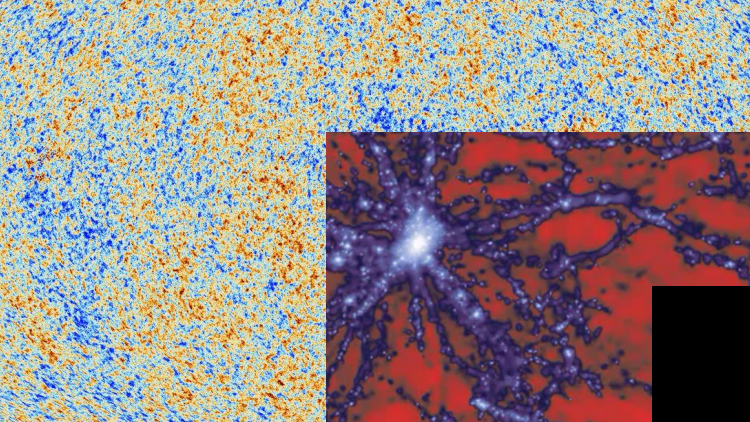
Shape of blobs = Cosmic Web

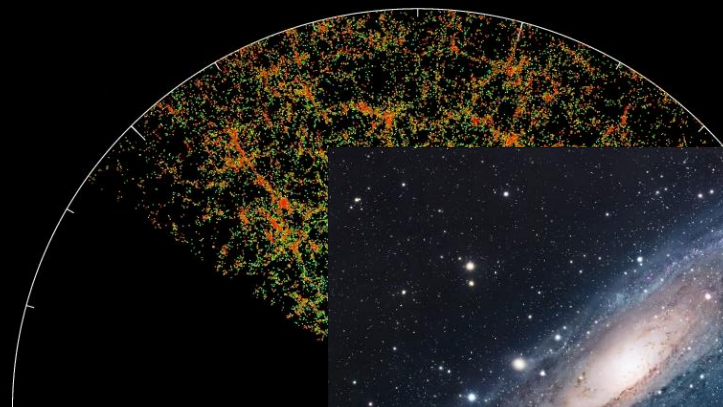
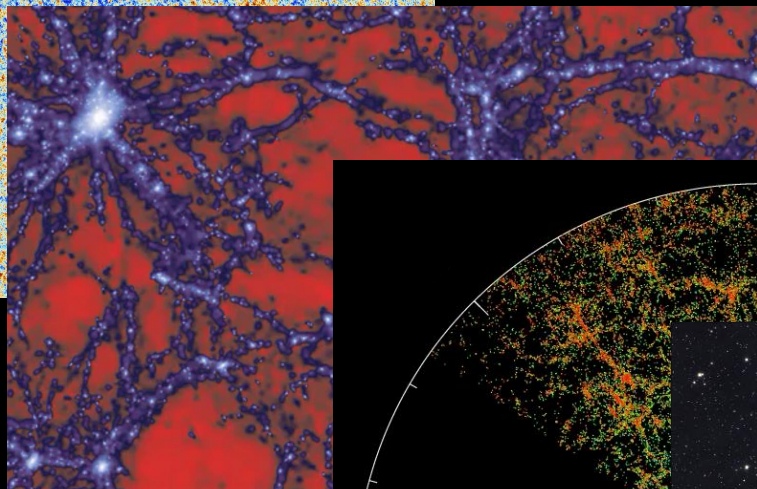
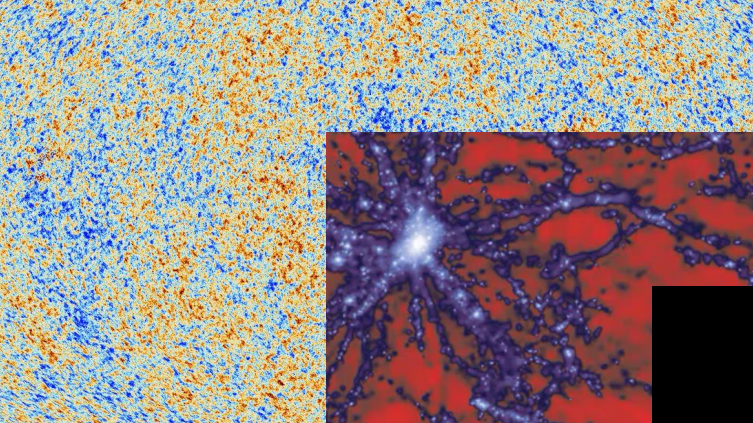


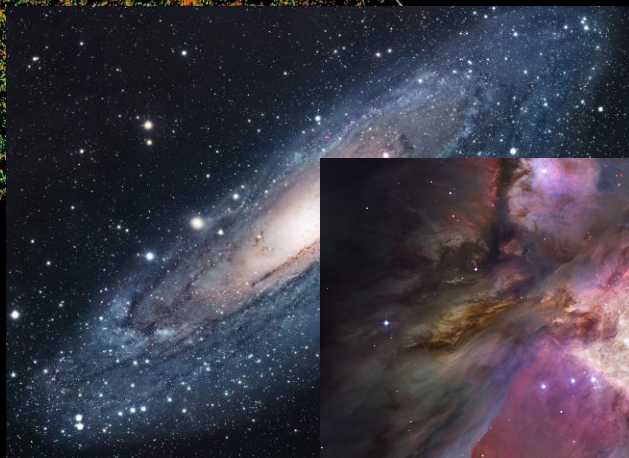
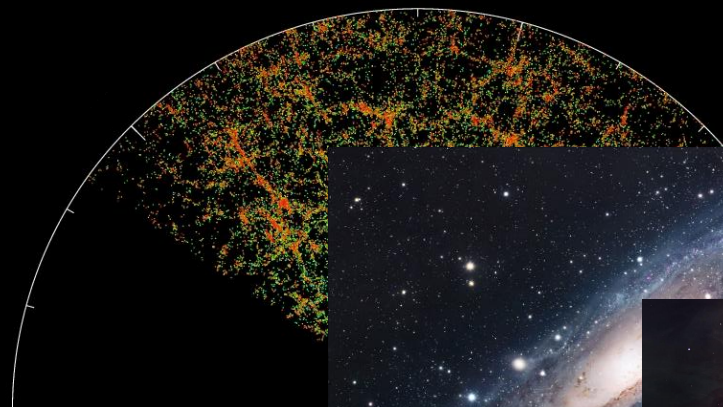
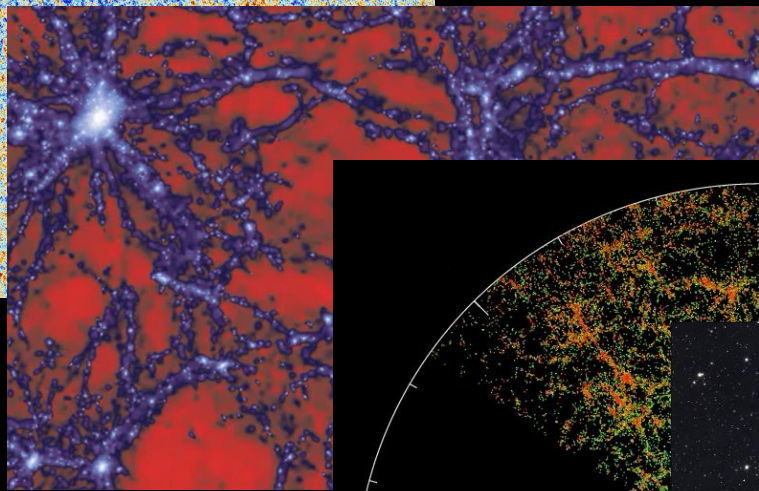
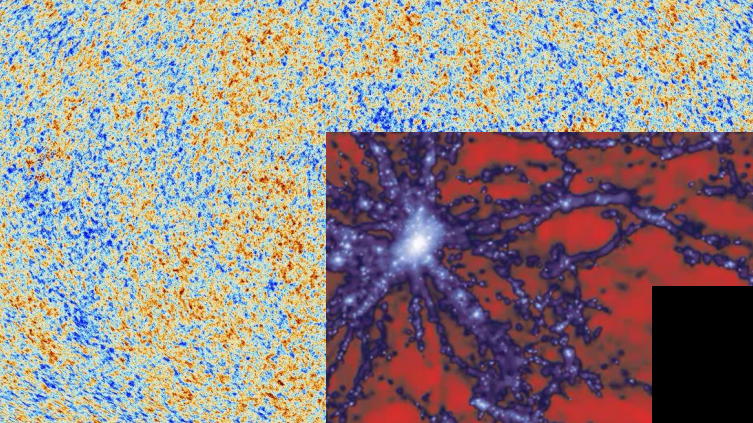
Brightness of blobs = Stars being born

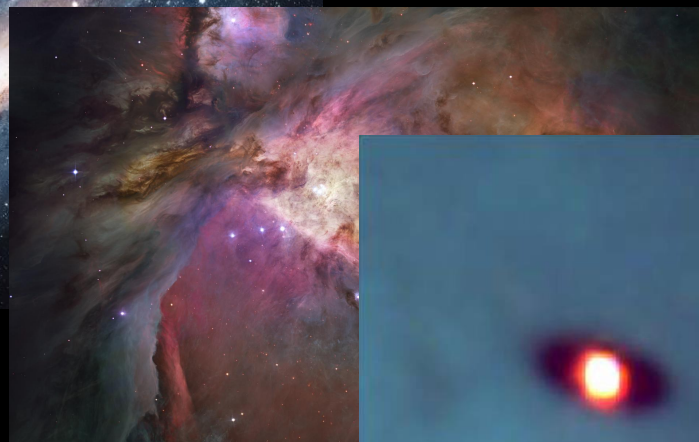
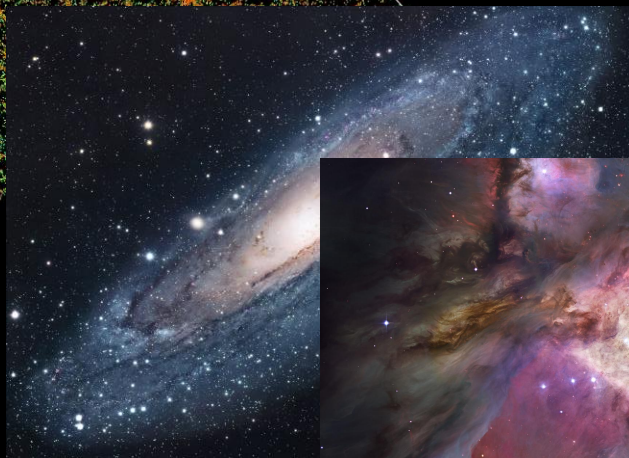
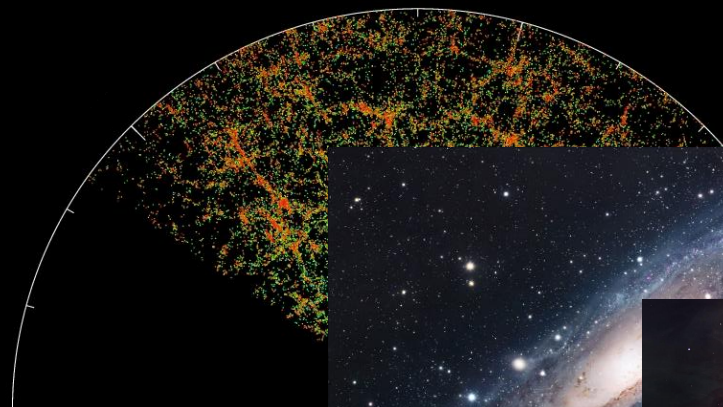
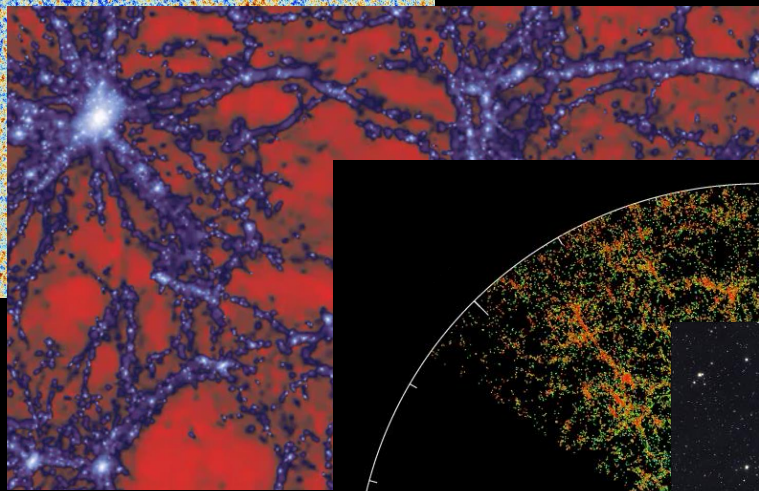
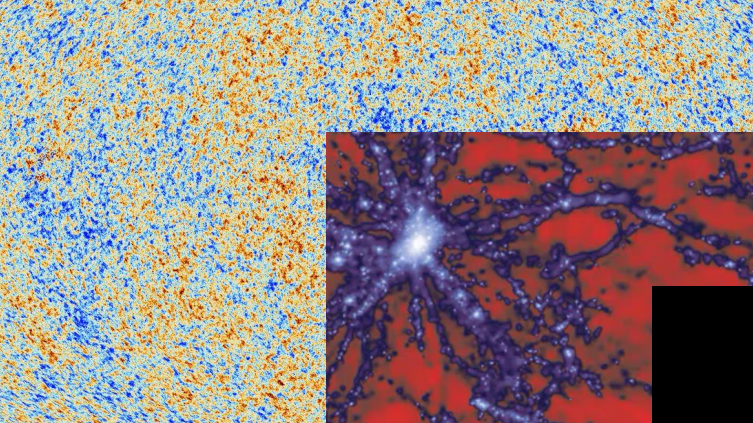


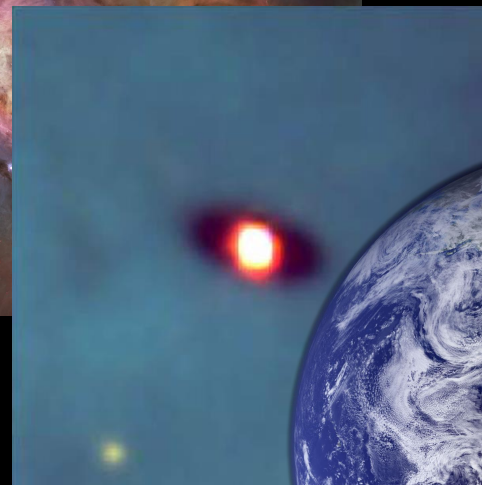
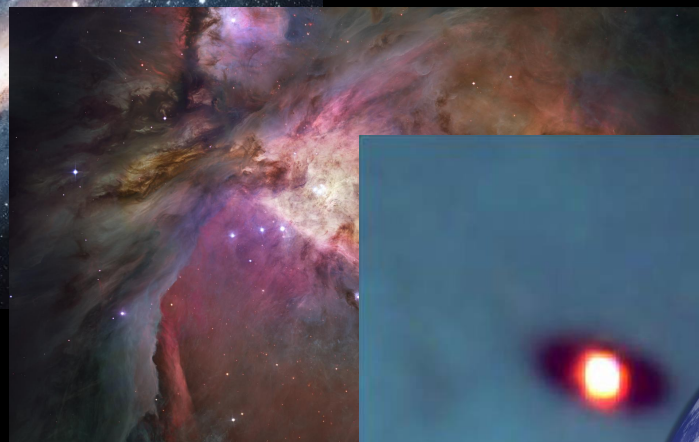
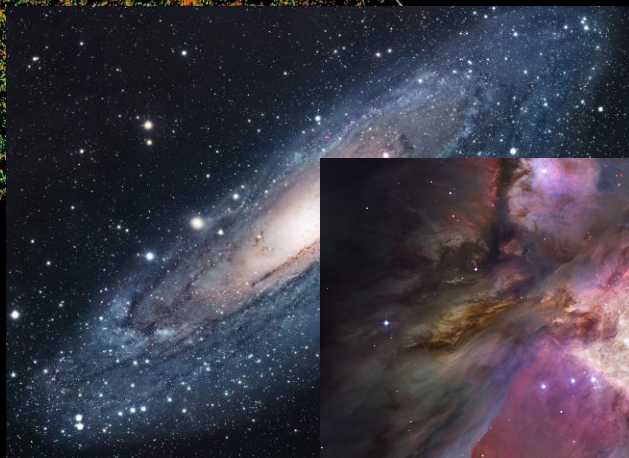
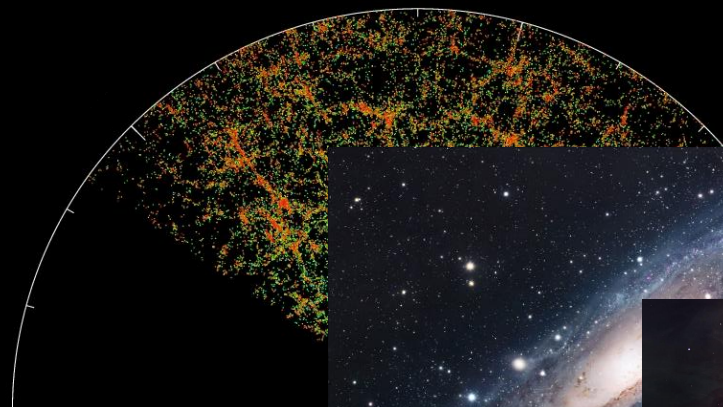
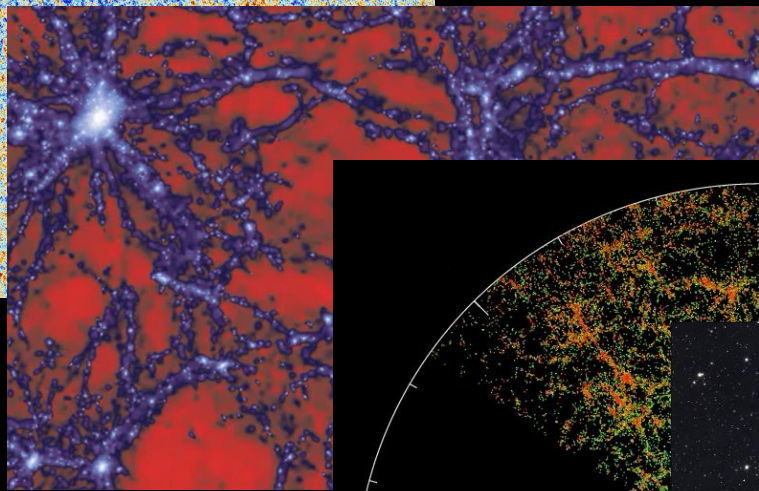
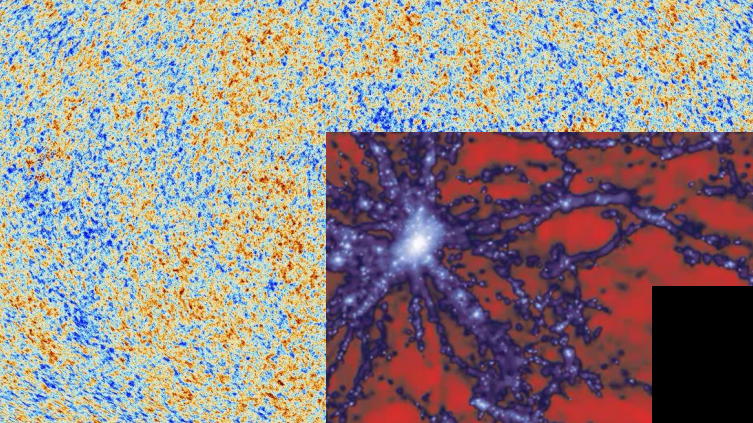












Hydrogen Gas



Hydrogen Gas



+

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14 Billion Years

Hydrogen Gas



+

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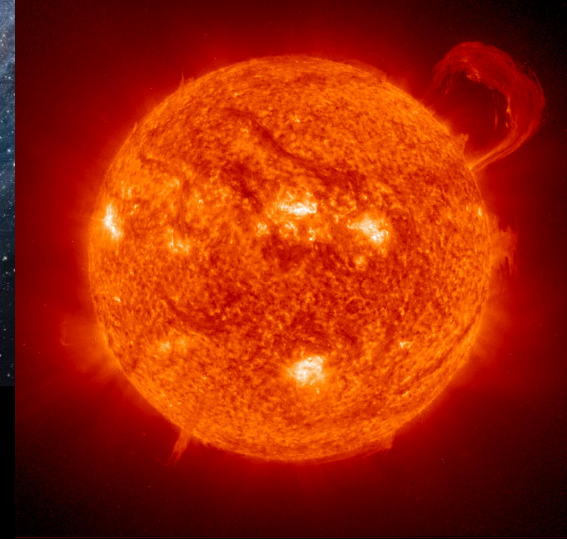
14 Billion Years

Hydrogen Gas



+

=



14 Billion Years

Hydrogen Gas

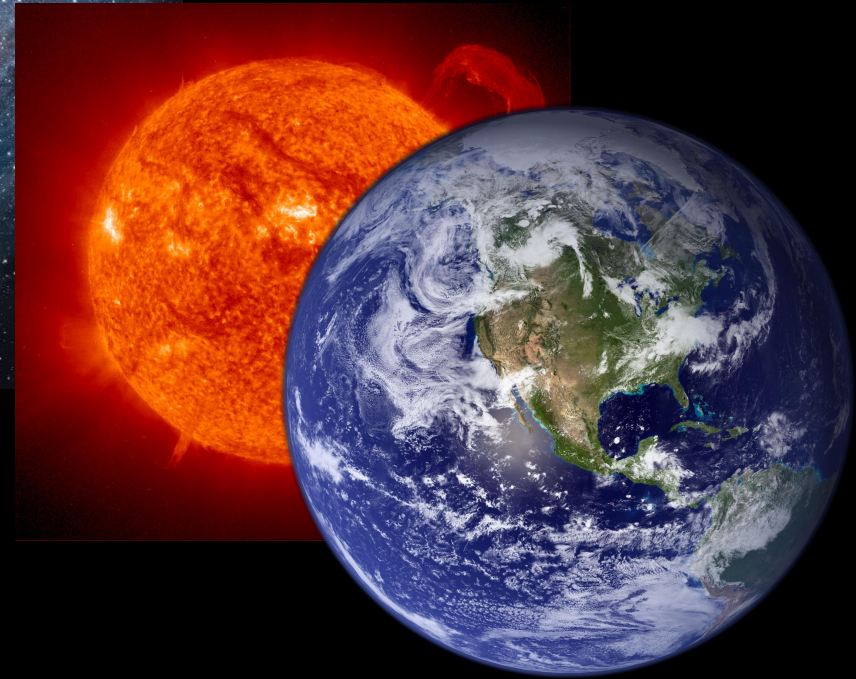


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14 Billion Years



Hydrogen Gas



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14 Billion Years



Hydrogen Gas



+

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14 Billion Years



Hydrogen Gas



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14 Billion Years



A Brief History of Everything