

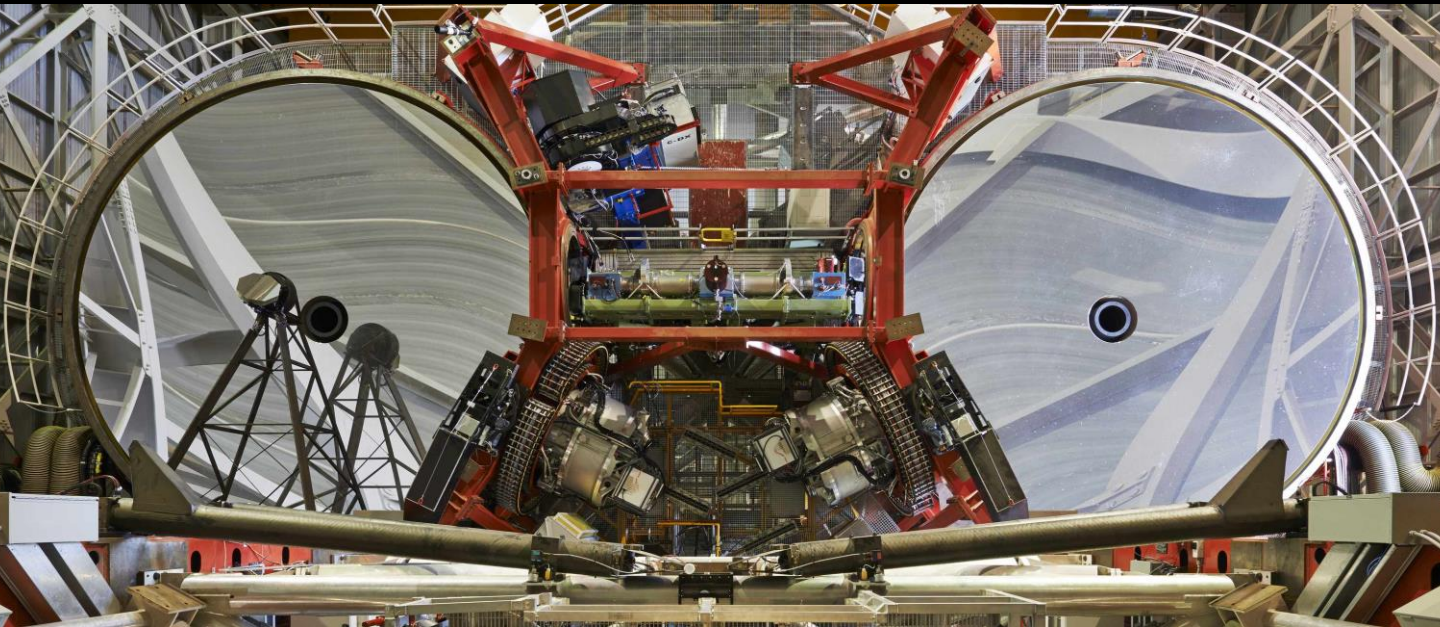


Our Place in the Universe

From Earth to the Stars

Dr. Jonathan Crass









Our Place in the Universe

- So just where are we in the Universe?
 - Distances in astronomy
- The changing and evolving Universe
 - The Big Bang
 - The birth, life and death of stars
 - Making the galaxies we see
- What makes up the Universe?

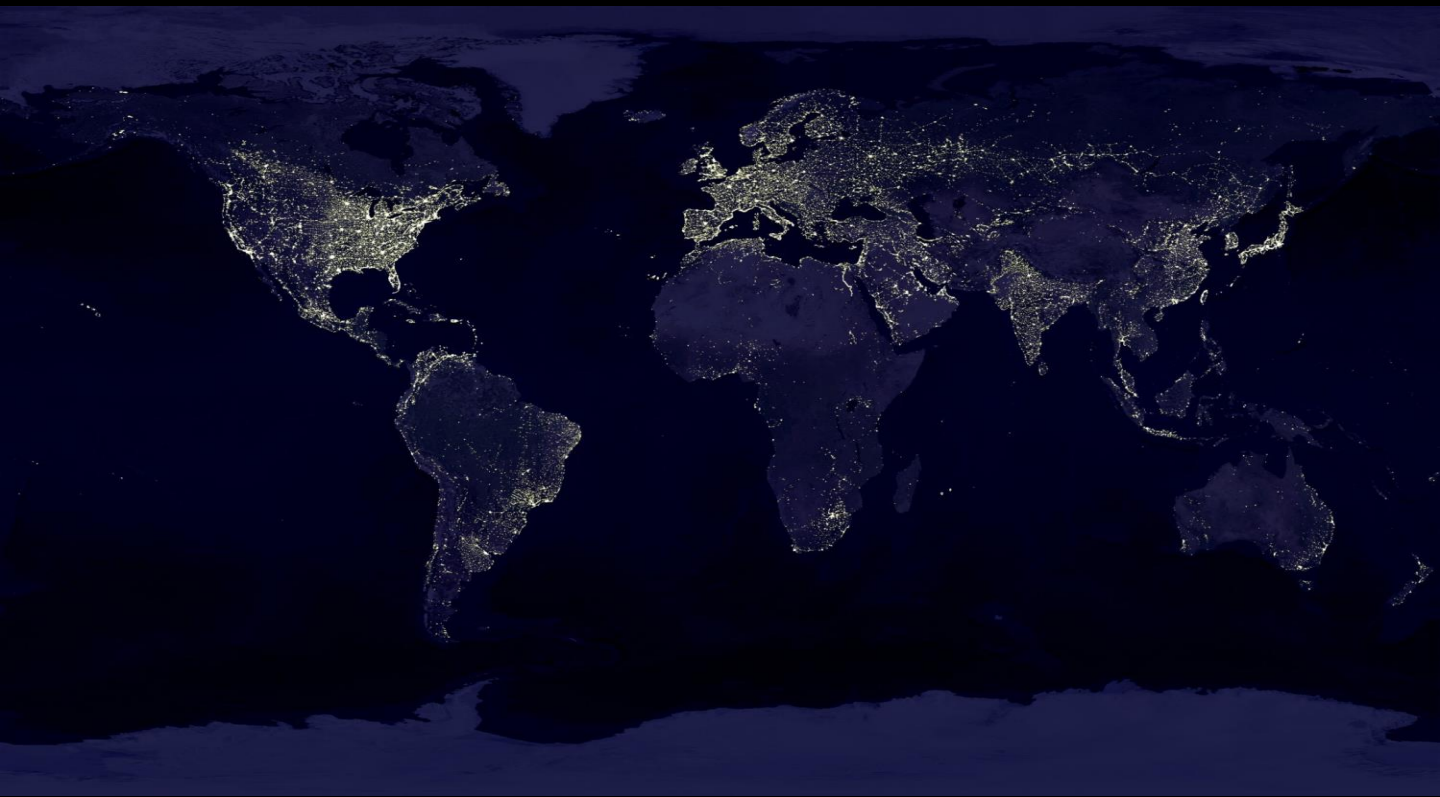




The United Kingdom

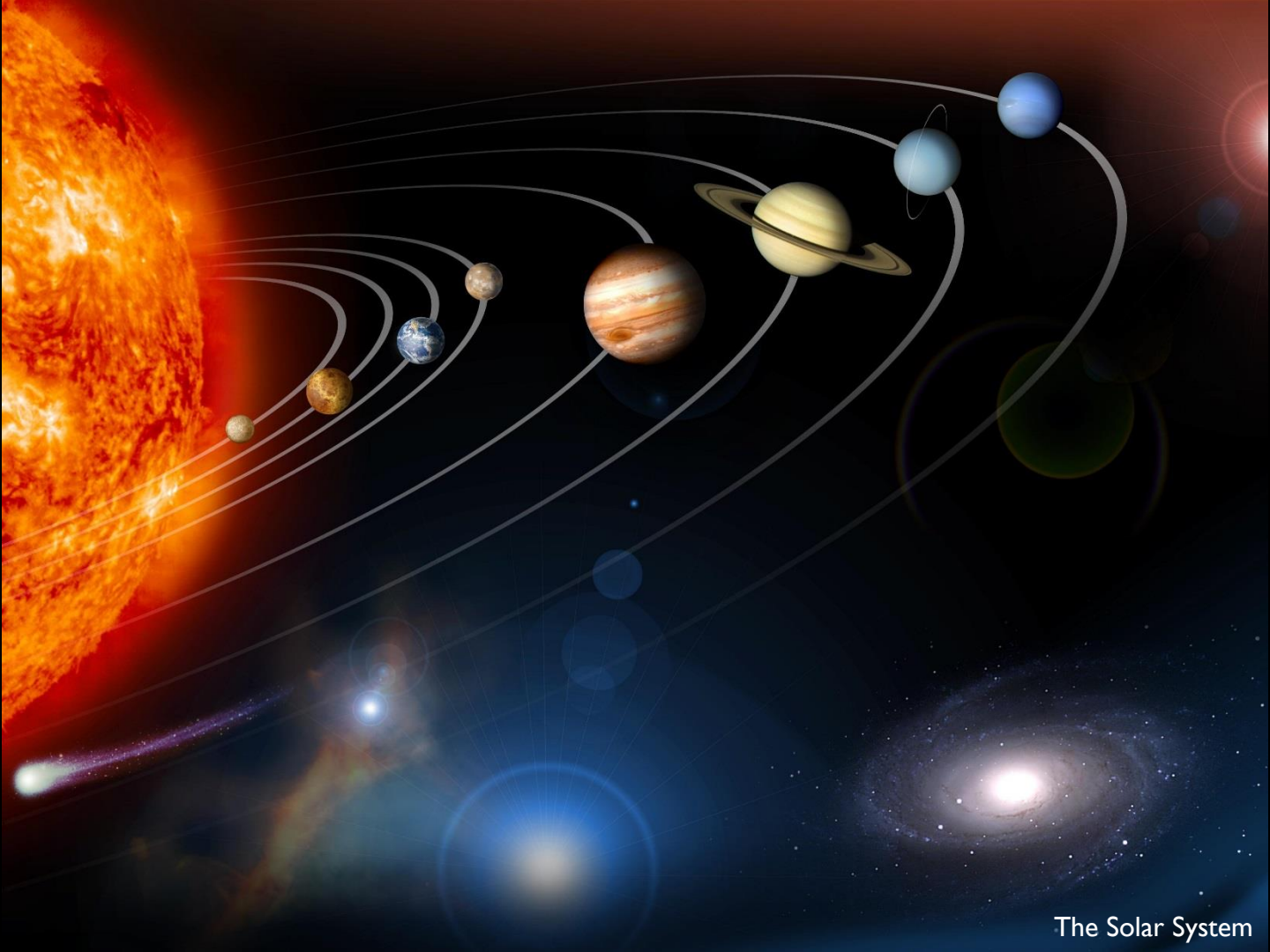


Europe

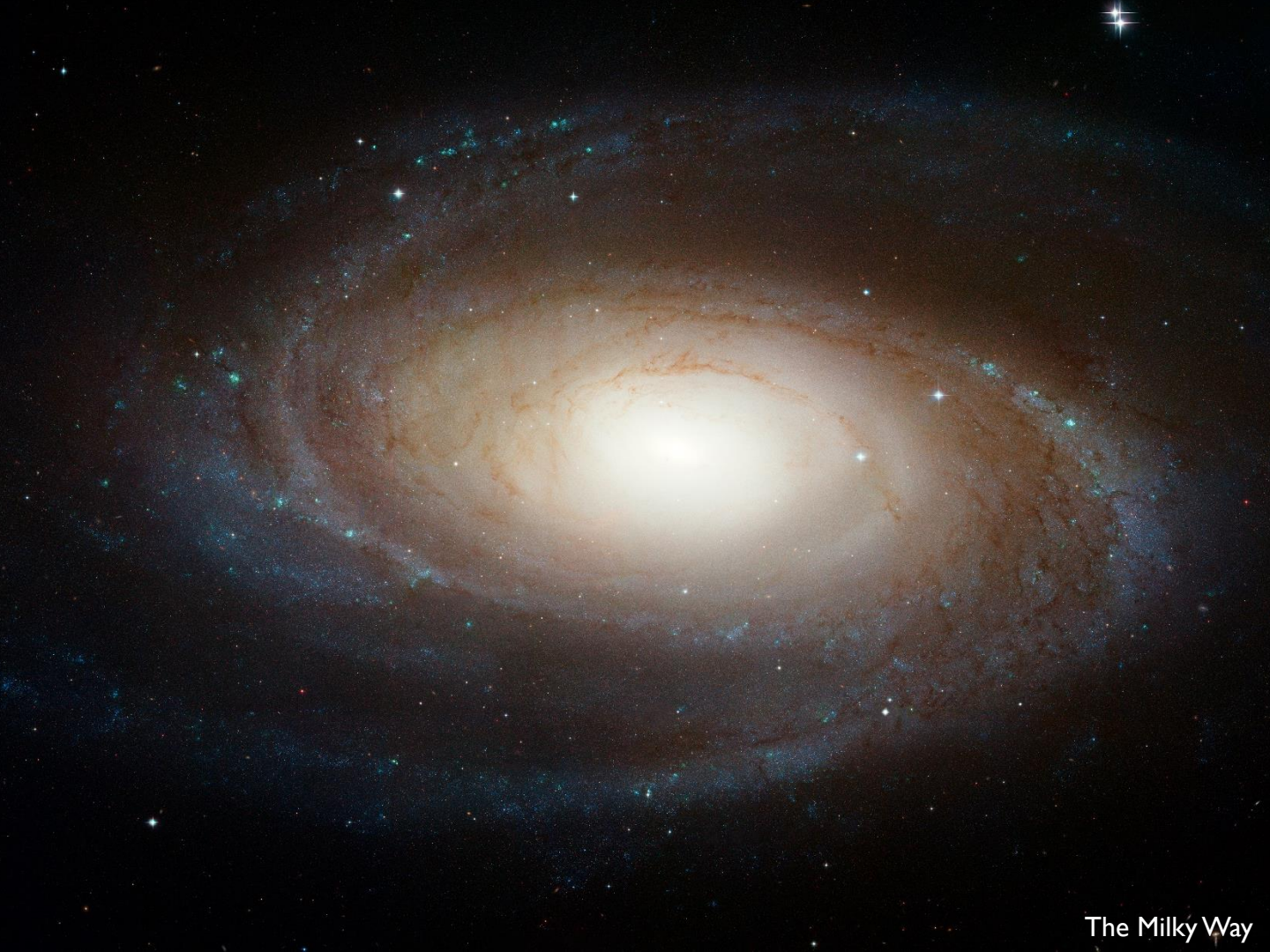




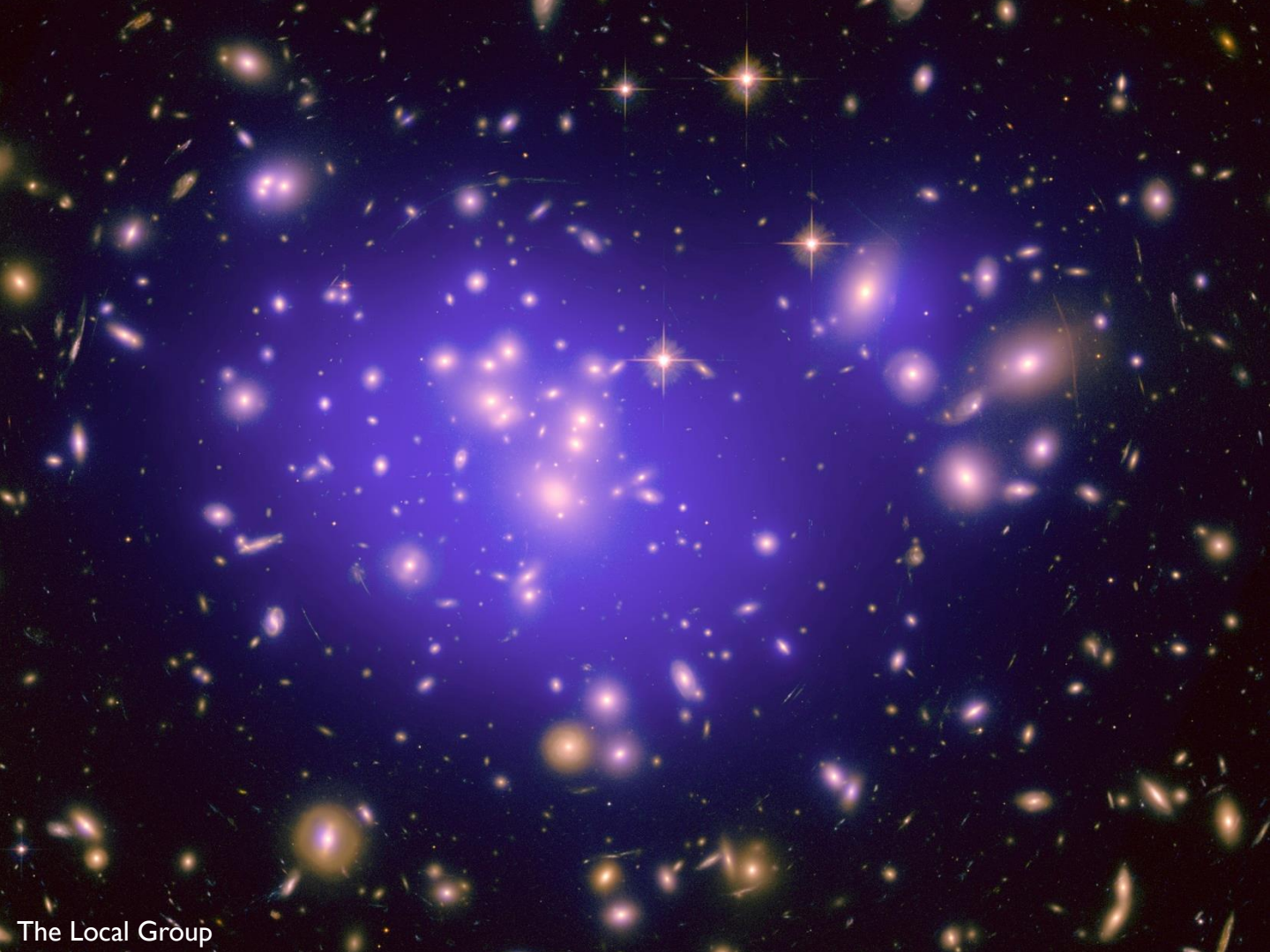
The Earth



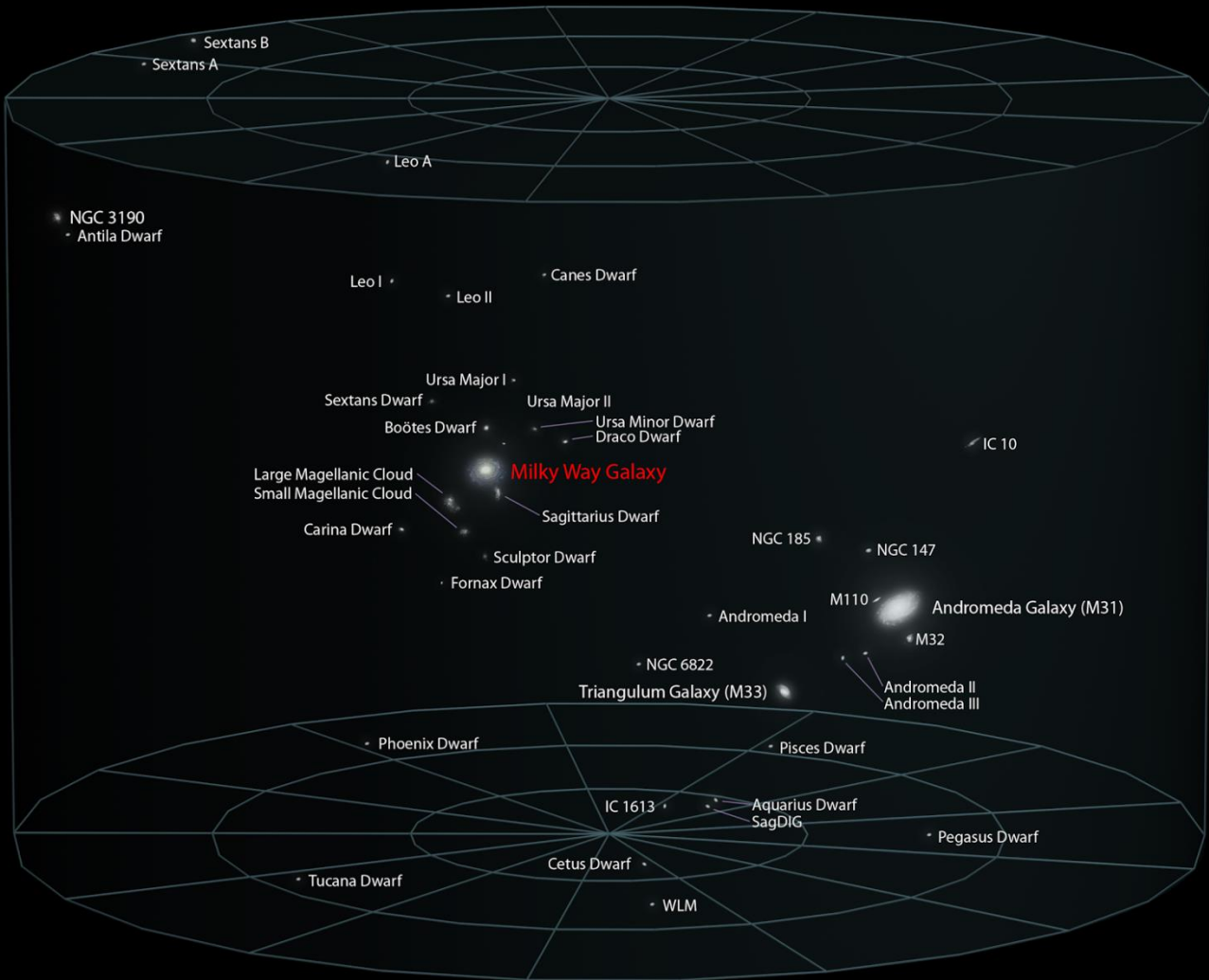
The Solar System

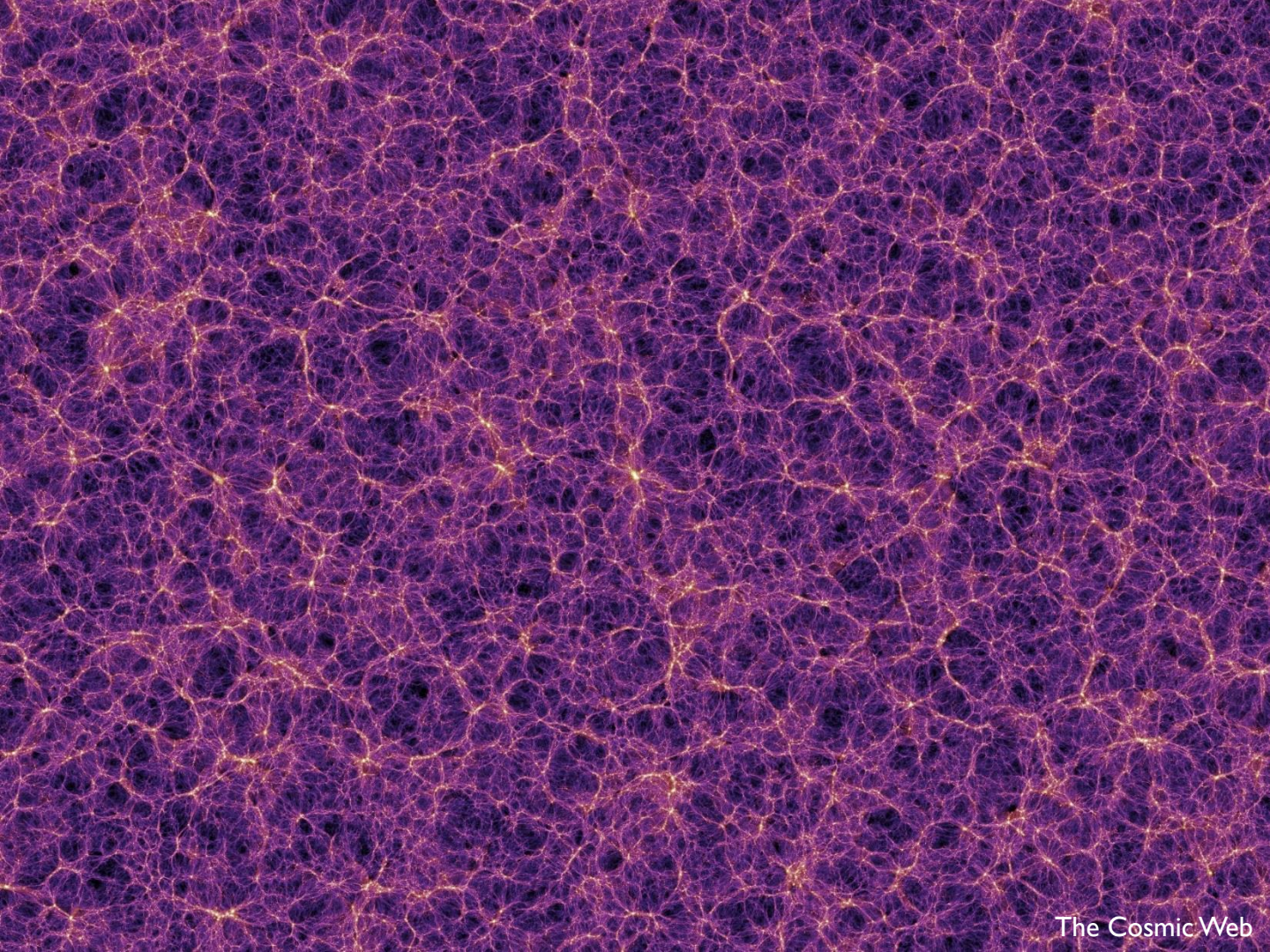


The Milky Way

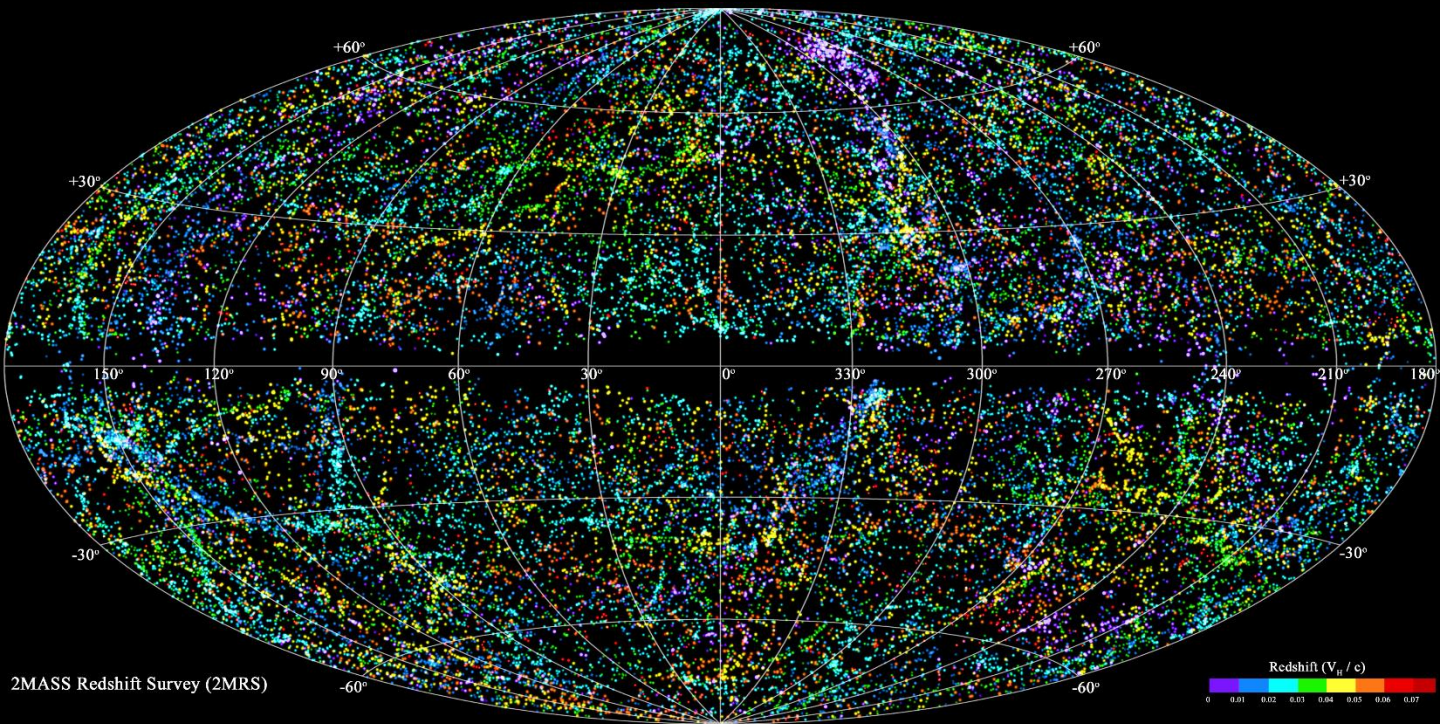


The Local Group



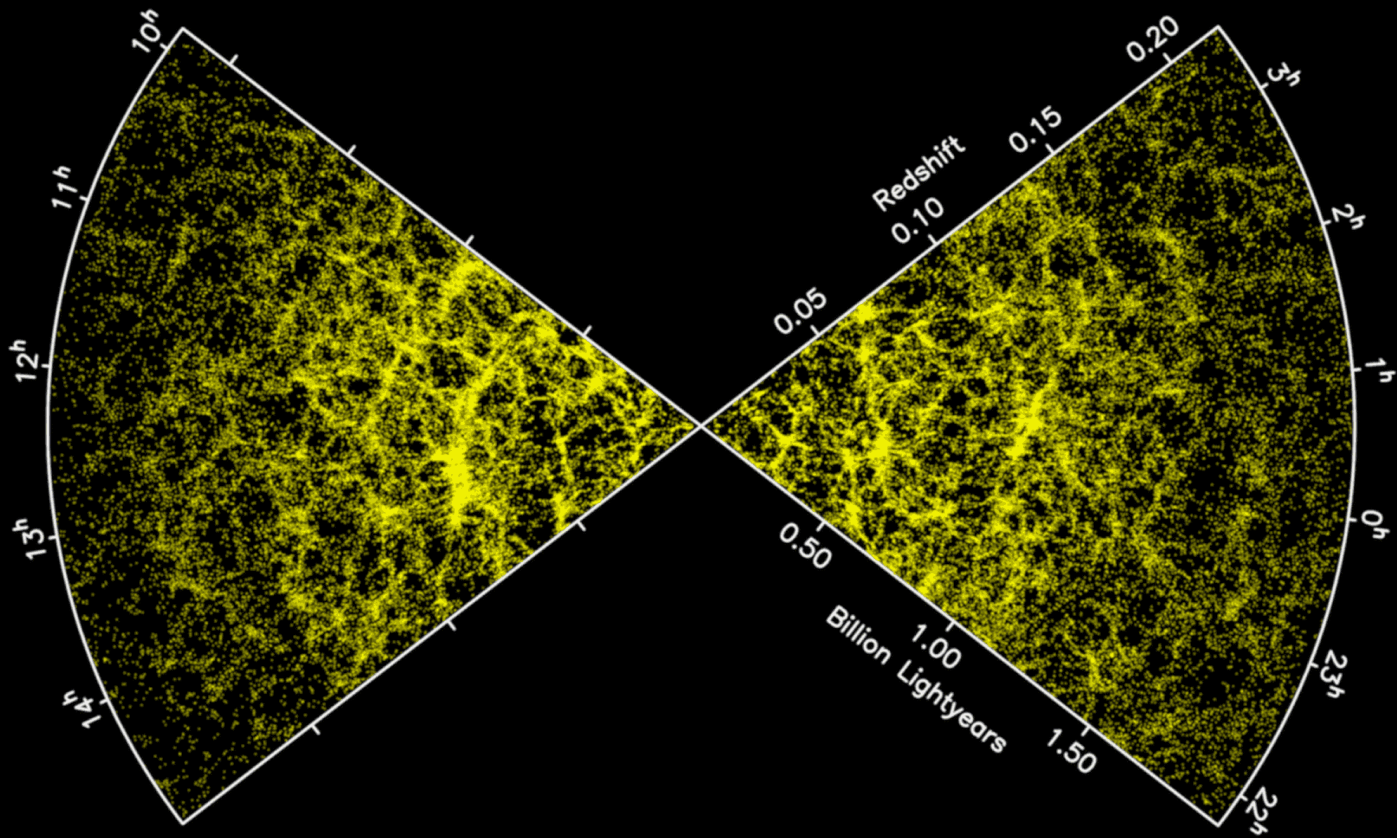


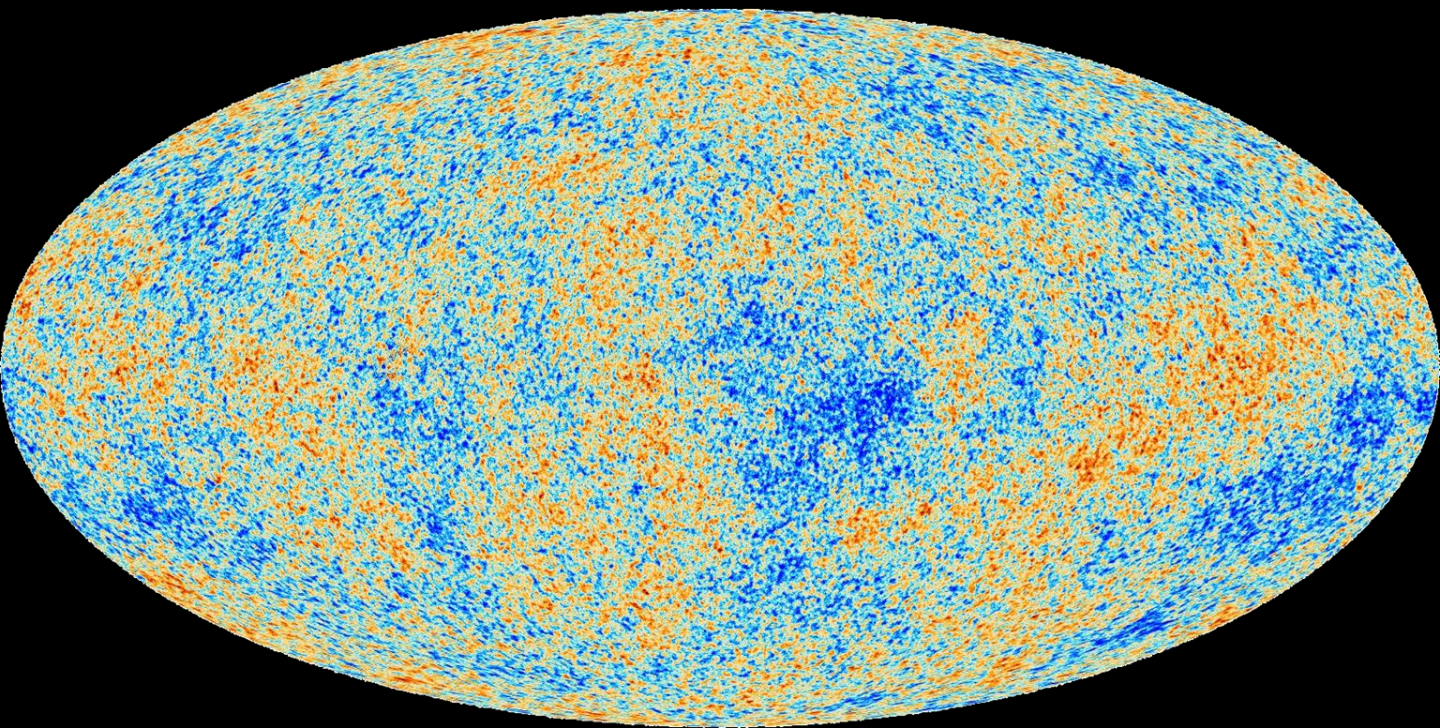
The Cosmic Web



2MASS Redshift Survey (2MRS)







The Cosmic Microwave Background

So where are we?

Our Earth Address

Cunard Line,
Southampton,
Hampshire,
United Kingdom,
Europe,
The Earth

Our Universal Address

Cunard Line,
The Earth,
The Solar System,
The Milky Way,
The Local Group,
The Universe

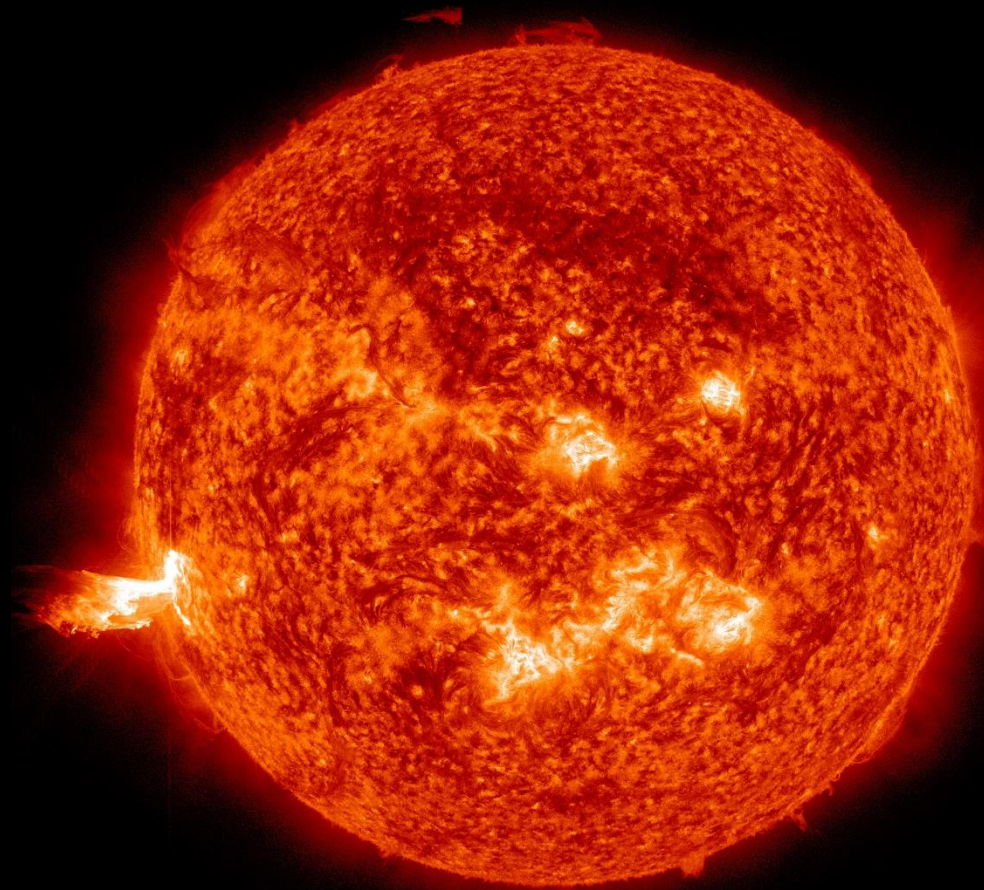
Cosmic Distances



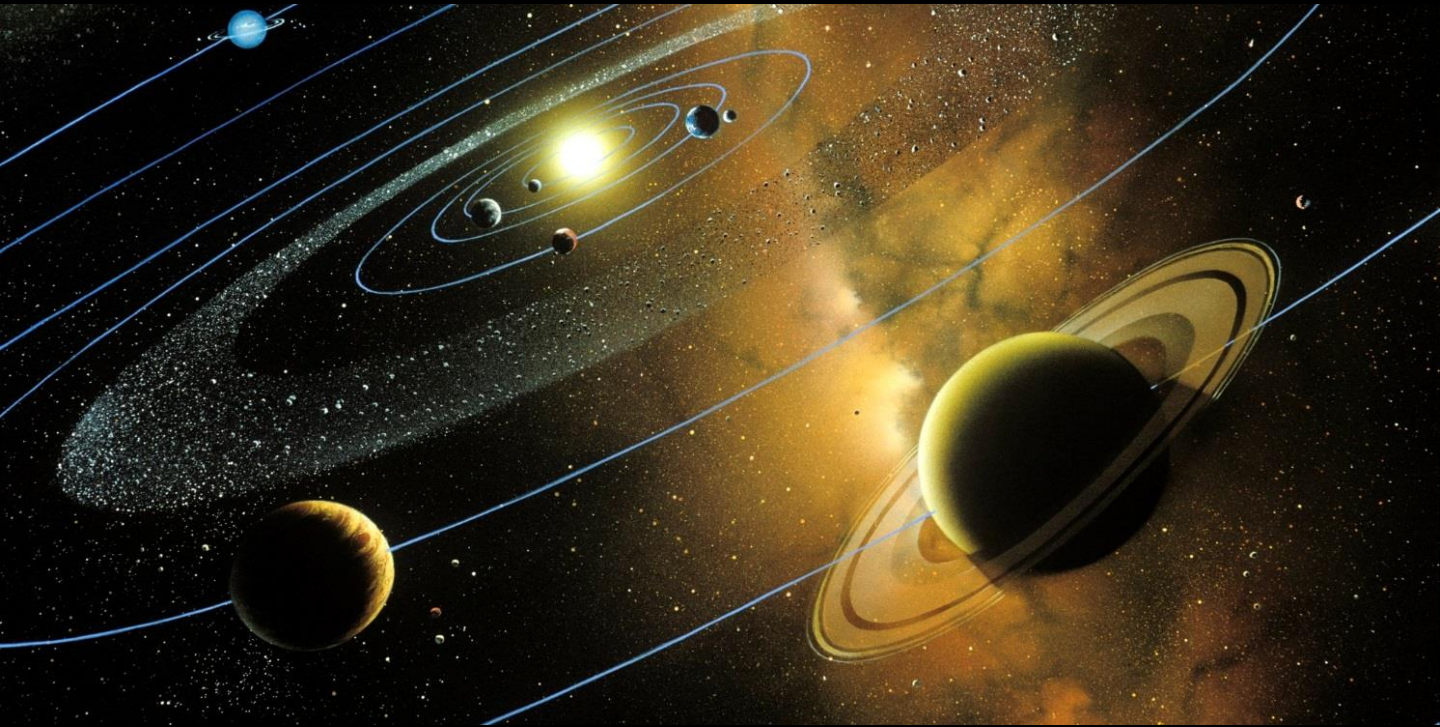
Sydney to Singapore: 3,900 miles / 6,300km



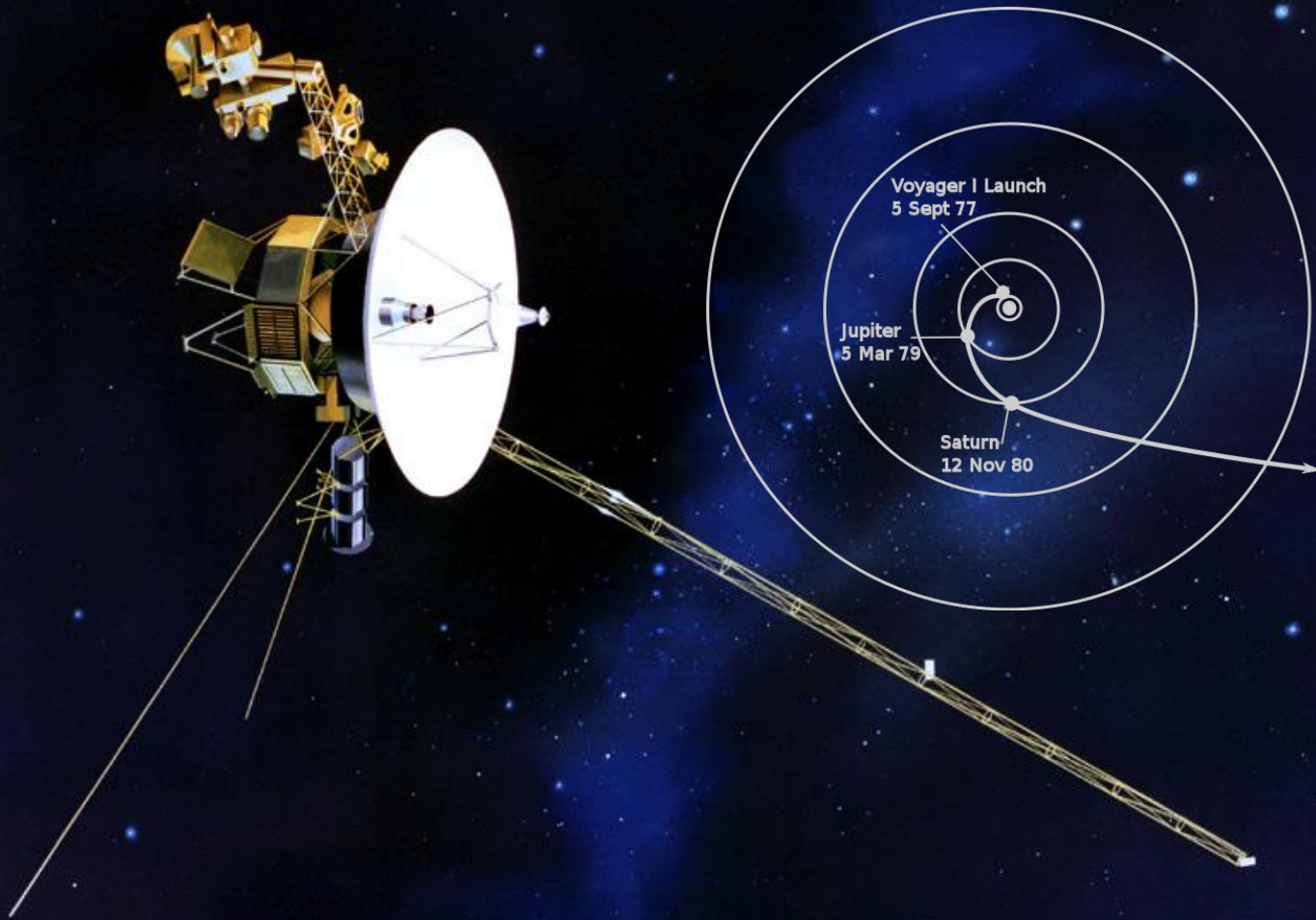
Earth to the Moon: 238,900 miles / 384,400 km



Earth to the Sun: 92,960,000 miles / 149,600,000 km



The edge of the Solar System: 9,000,000,000 miles / 14,484,096,000 km



Voyager 1 Launch
5 Sept 77

Jupiter
5 Mar 79

Saturn
12 Nov 80



Queen Mary 2

Q

QUEEN MARY 2

Distances in Astronomy

- At the maximum speed of Queen Mary 2 (35mph)
 - Sydney to Singapore:
5 days
 - Earth to the Moon:
284 days
 - Earth to the Sun:
302 years
 - To the edge of the Solar System:
29,334 years



Distances in Astronomy

- At the speed of light
 - Sydney to Singapore:
0.0210 seconds
 - Earth to the Moon:
1.28 seconds
 - Earth to the Sun:
8.3 minutes
 - To the edge of the Solar System:
13.4 hours

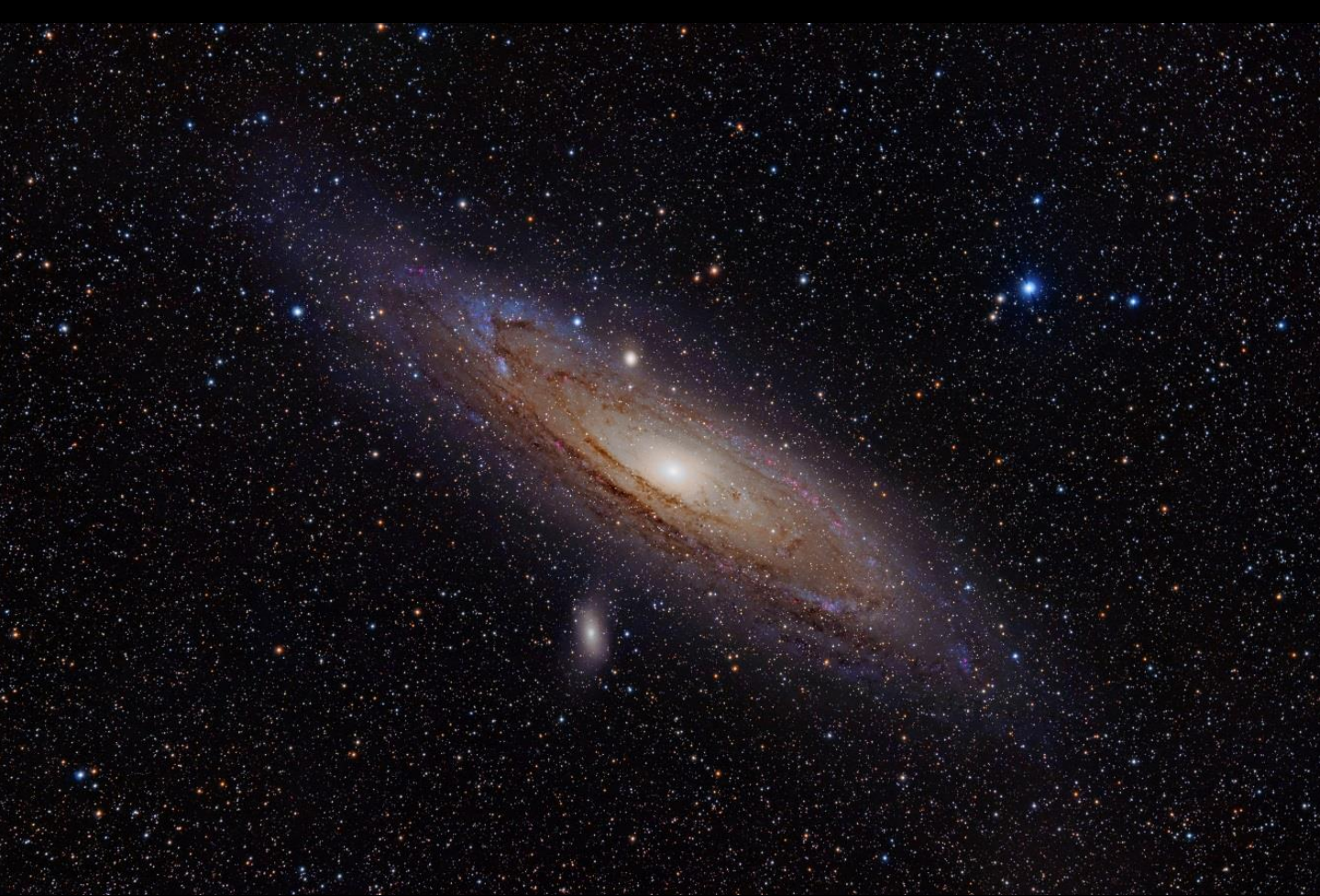
Units of Distance

- 1 Astronomical Unit (AU)
 - The average distance between the Sun and the Earth
 - 149,597,871 km
- 1 Light Year (ly)
 - The distance light would travel in 1 year
 - 9,460,528,410,000 km

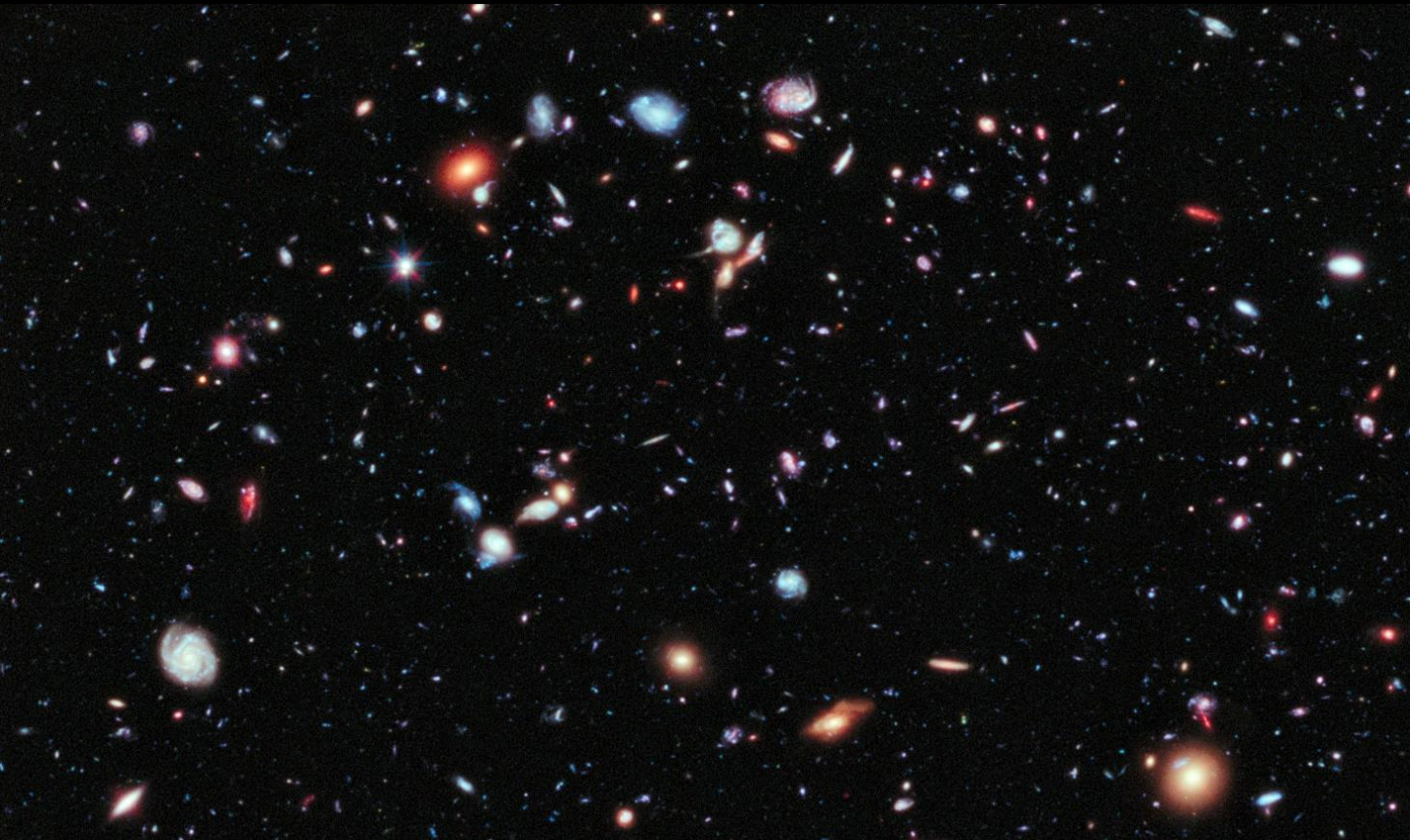




To the centre of the Galaxy: 25,900 light years



To the Andromeda Galaxy: 2,538,000 light years



To the most distant Galaxy known: 13,000,000,000 light years

Our Location – a Summary

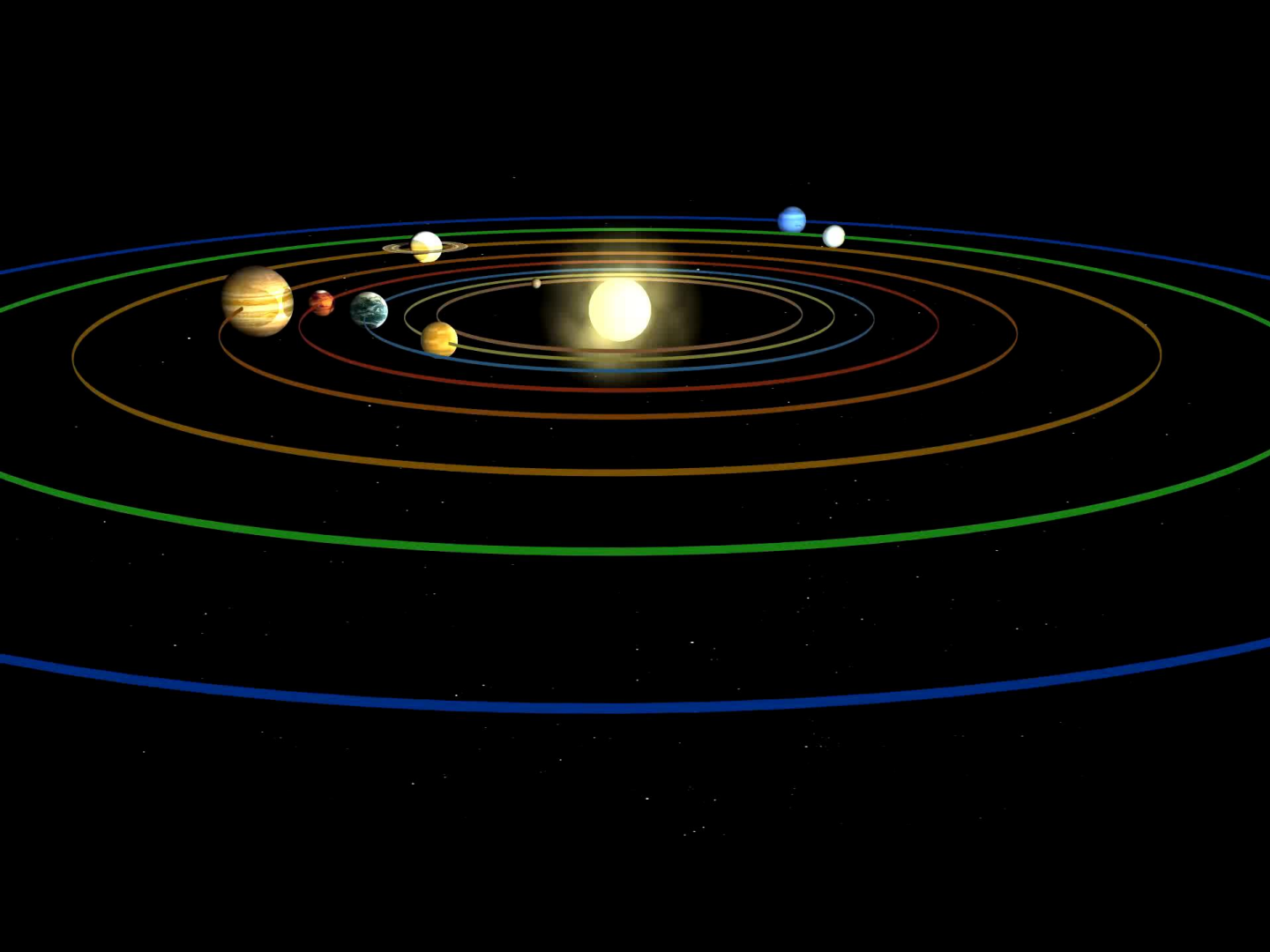
- We are:

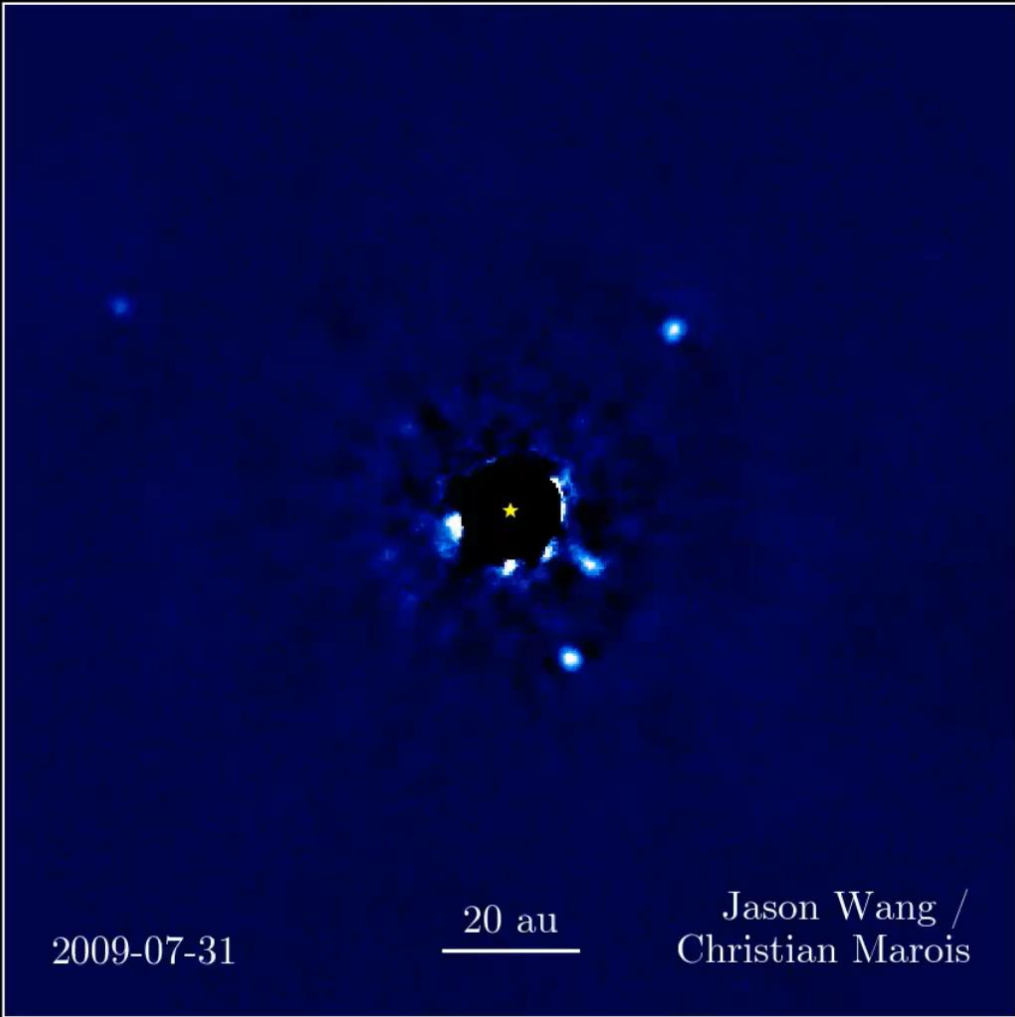
On Earth	km/miles
Which is in the Solar System	50-100 AU
Which is in the Milky Way	50 thousand ly
Which is in the Local Group	10 million ly
Which is in the Cosmic Web	Billion ly
Which is in the Universe	13.8 Billion ly

The changing and evolving Universe

The Universe Today

- The Universe isn't static – it evolves



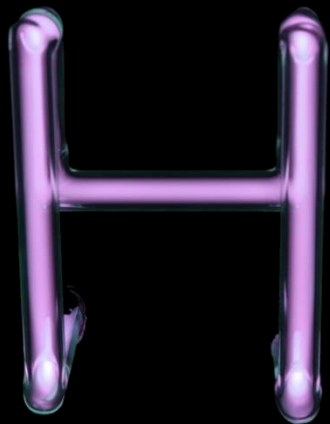


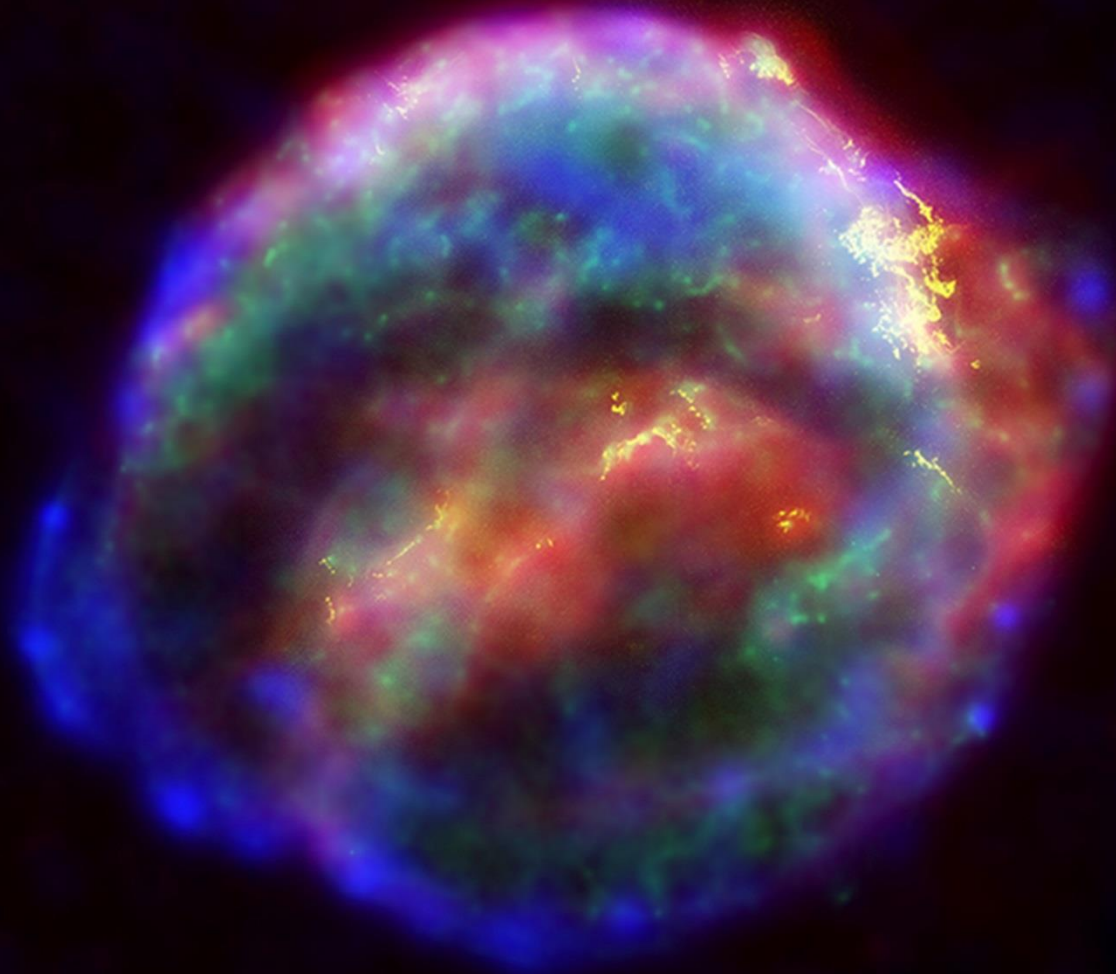
2009-07-31

20 au

Jason Wang /
Christian Marois







alpha Persei



Pleiades

Orion







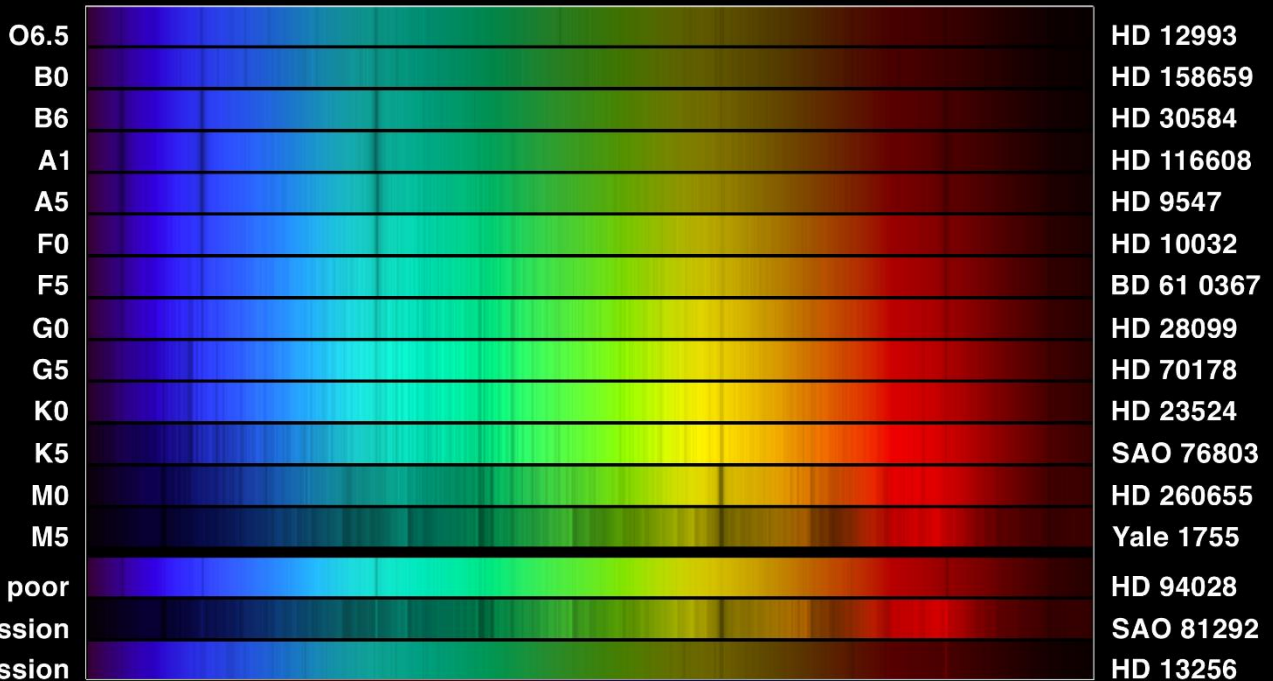




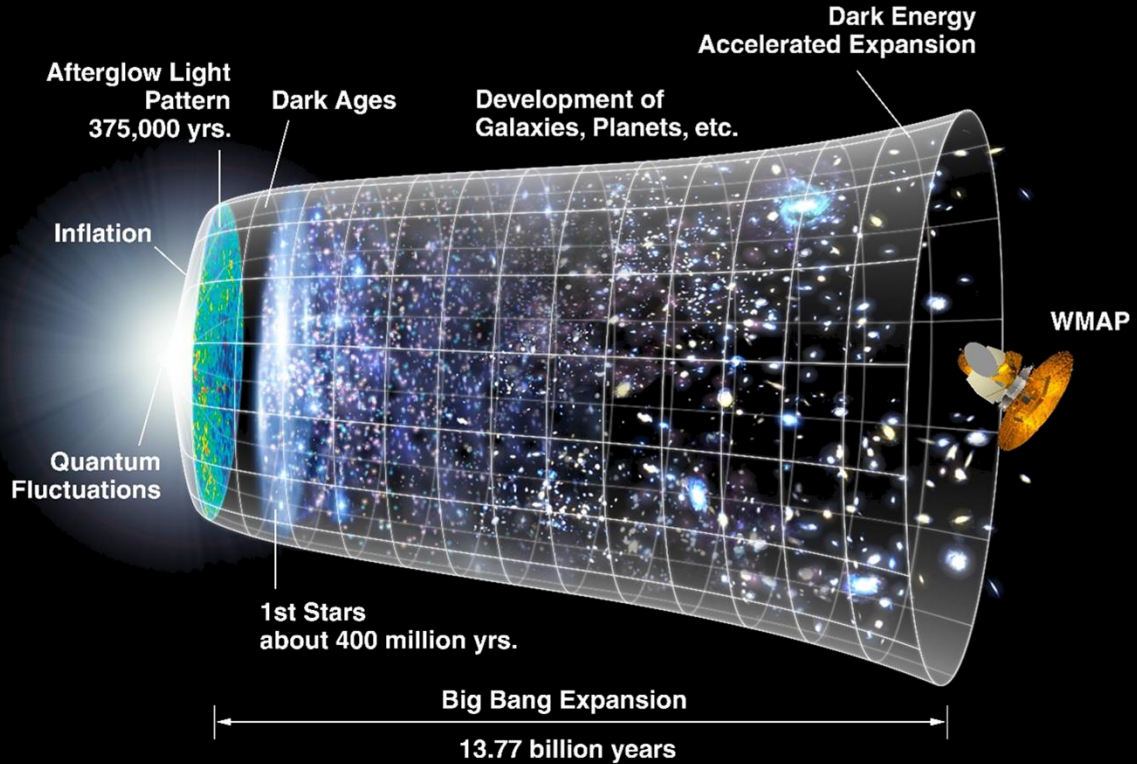


Starting at the beginning



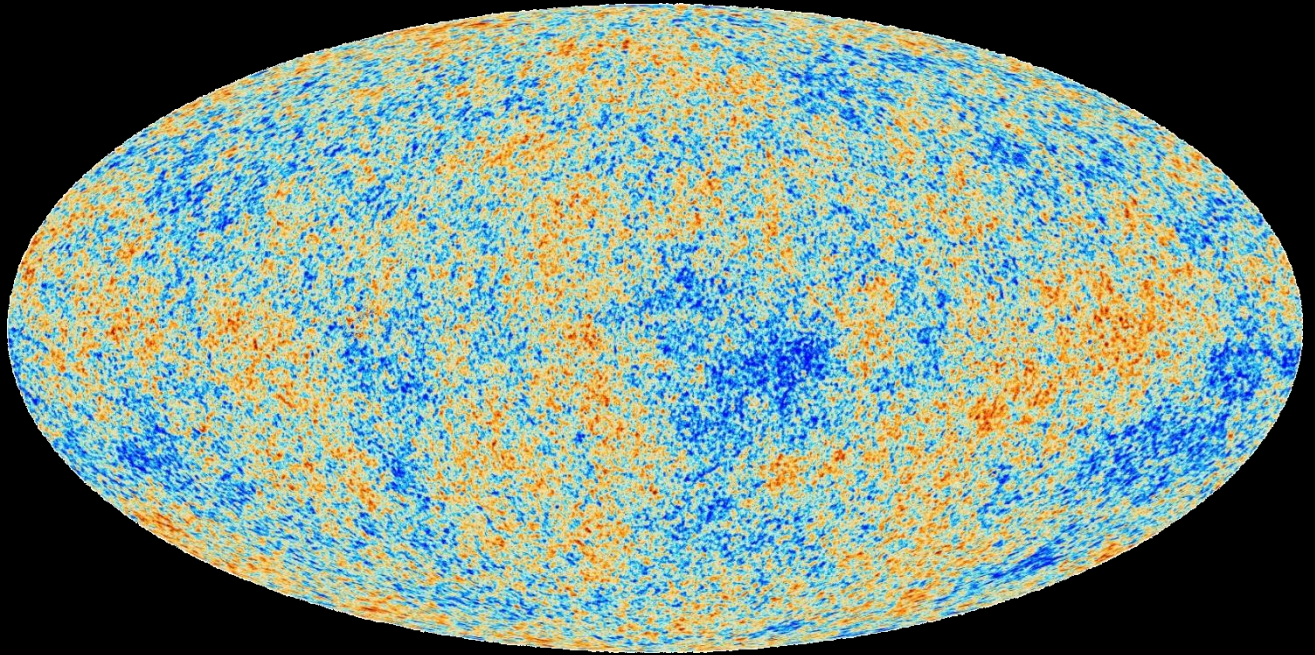


The Big Bang

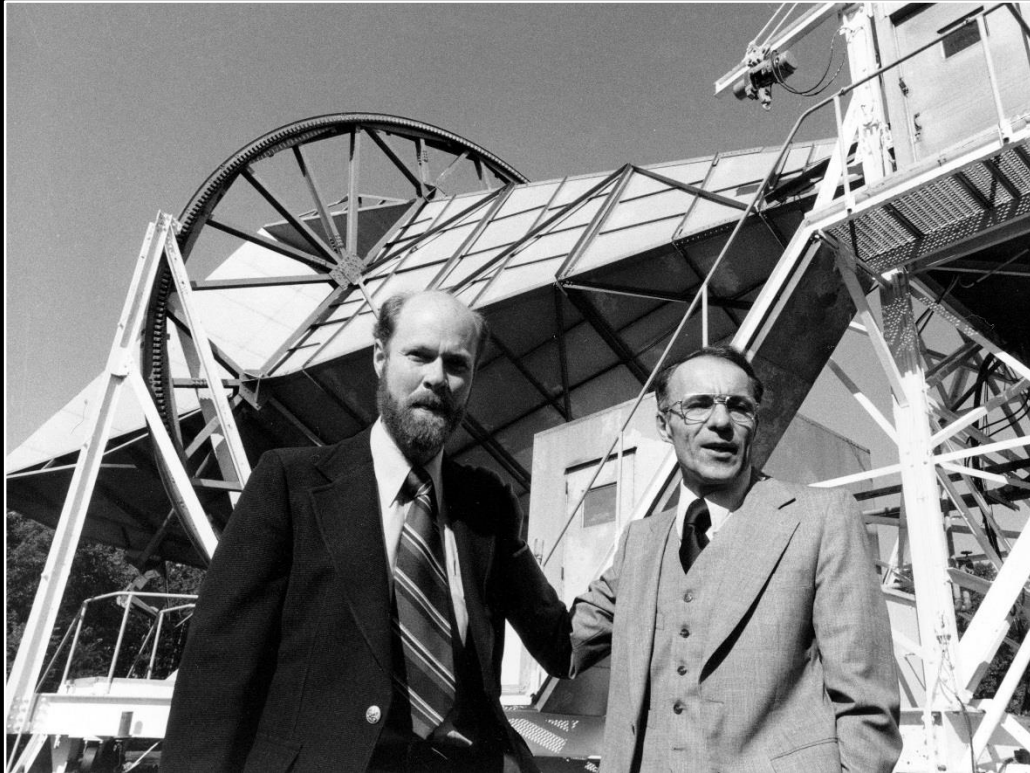


1,000,000,000,000,000,000,000,000,000,000,000°C

The Cosmic Microwave Background



The Cosmic Microwave Background

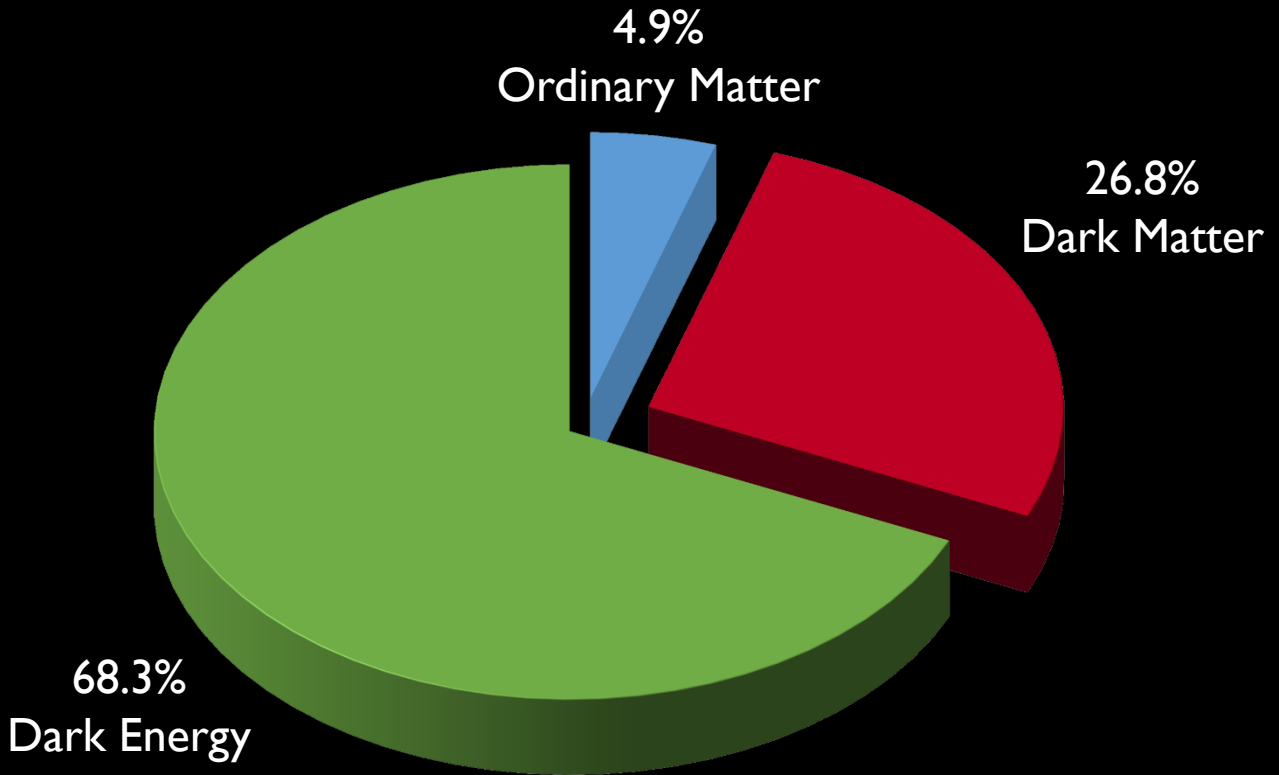


Forming Structure

- The Universe is clumpy

It's all the fault of Gravity!

The Universe of Today





Thank you