

The Universe and You!

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For Yusuf and Hira,
- S.U.R

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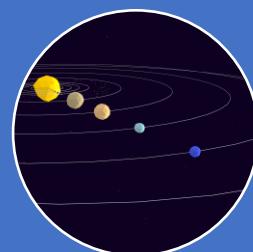
Is the universe here yet?



You are here



We live on Planet Earth



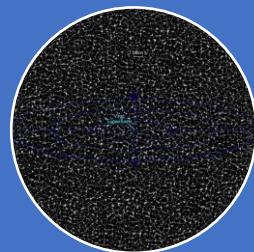
Which is part of the Solar system



In the Milky Way galaxy



In the Virgo Supercluster



In the Universe

This book belongs to _____

My address is _____, _____, _____, Planet Earth, the Solar System, the Milky Way, Virgo Supercluster, the universe!

The big bang!

Did you know, everything you see around you, the oceans, the massive mountains, this book, your body and yes, the stars and the universe were once created from a mass smaller in size than the period at the end of this sentence.

Yup, smaller than this dot!



It's hard to believe, isn't it!

The age of our universe

As far as we, humans  , understand this dot  expanded at more than a billion miles per second about 14 billion years ago




14 billion
years ago



We are here

A universe full of energy

And this little dot ● in the beginning was full of hot energy (10 billion trillion trillion degrees Celsius to be exact)



It must have been quite an explosion



The first stars

After all, all this energy ⚡ had to go somewhere, right...?

After about 200 million years, stars ★ began to form!



The early galaxies

Soon after, the first galaxies



began to appear

14 billion
years ago



We are here



The Milky Way Galaxy

One of those galaxies  was the Milky Way Galaxy, home to the Sun and our own planet Earth.

The Sun is only one of about 200 billion stars in the Milky Way Galaxy!

14 billion
years ago



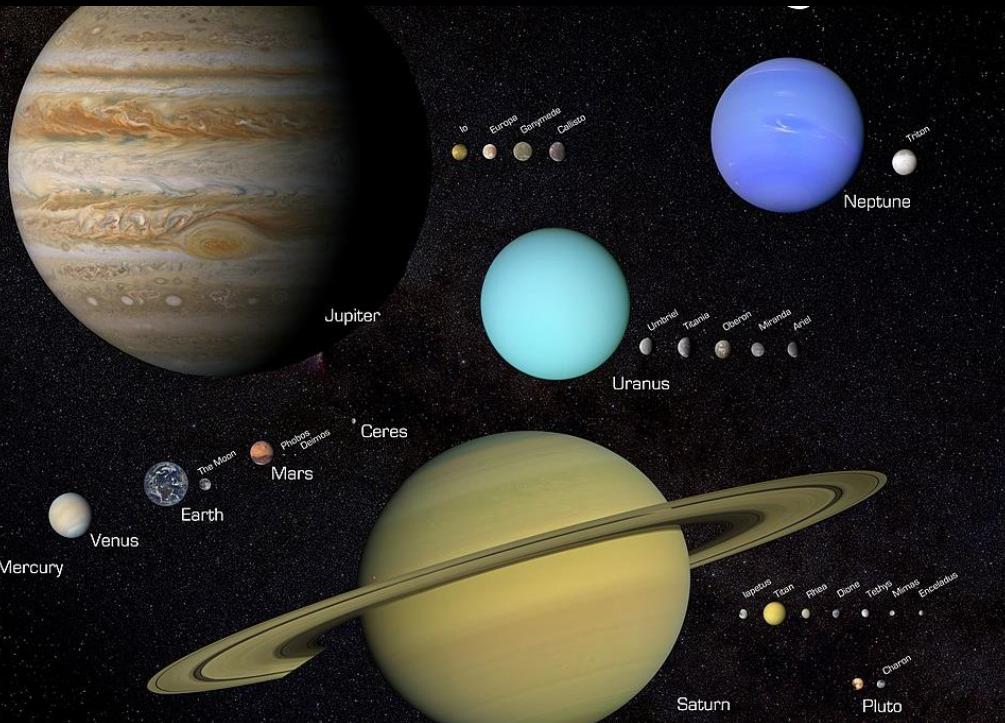
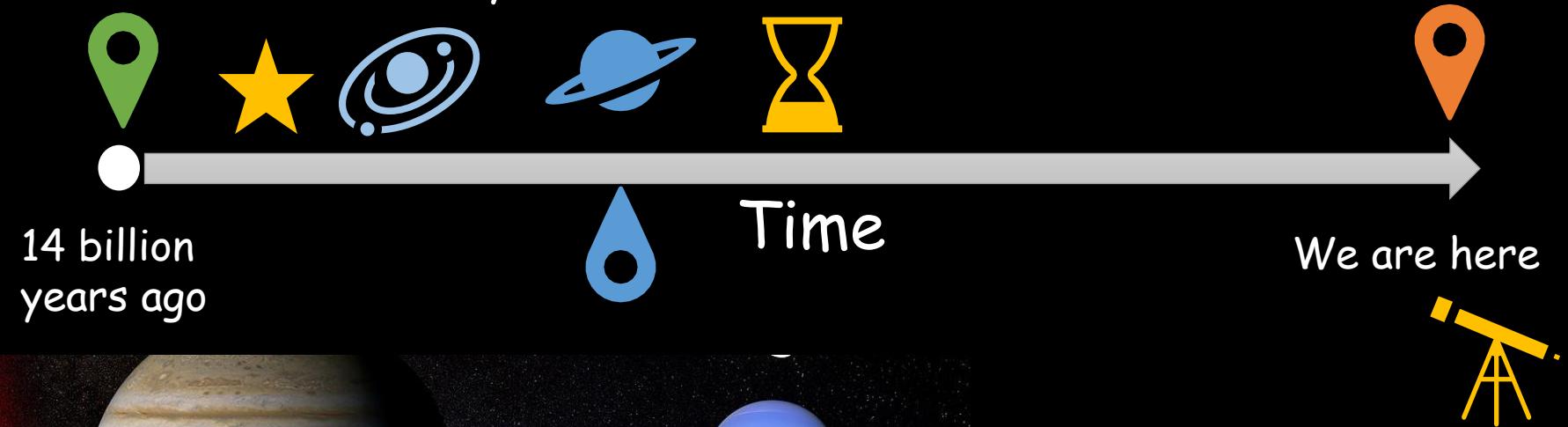
Time



We are here

Our Solar System

And our very own Solar System, the birthplace of our planet Earth, formed around 9 billion years back



The Earth is born

And sure enough, soon after, around 4.5 billion years ago, the Earth began to take shape!



Looking back in time

Did you know, when we look at the night sky, we see the stars and galaxies as they were many years ago!

This happens because light takes time to travel to Earth.

So, when we take pictures of the most far away galaxies, we see them as they were 13 billion years ago!

This way we get to learn how the universe changed with time.



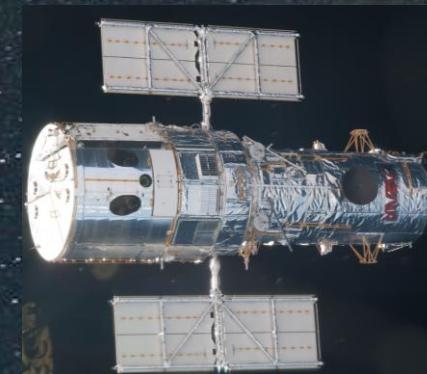
14 billion
years ago



Using powerful telescopes like Hubble, we can learn how the universe looked like very long ago



Time



We are here



Hubble Telescope has taken pictures showing how galaxies looked 13 billion years ago

How big is the universe?

The universe is huge! It is also mostly empty!

It takes light 100,000 years to get from one edge of the Milky Way galaxy to the other.

And as light travels 300,000 Kilometers in just 1 second you can imagine how big only the Milky Way must be!

And the Milky Way is one of about 7 trillion galaxies in the area of the universe that we can see

No one knows the exact size of the universe. But everyday it becomes larger and larger!

Star birth

New stars  are born all the time in the universe!

Stars take shape in huge clouds  of cold hydrogen gas.

Gravity pulls the clouds together to form balls which become smaller and hotter.

At some point, the balls become so hot  that they begin to shine like stars!

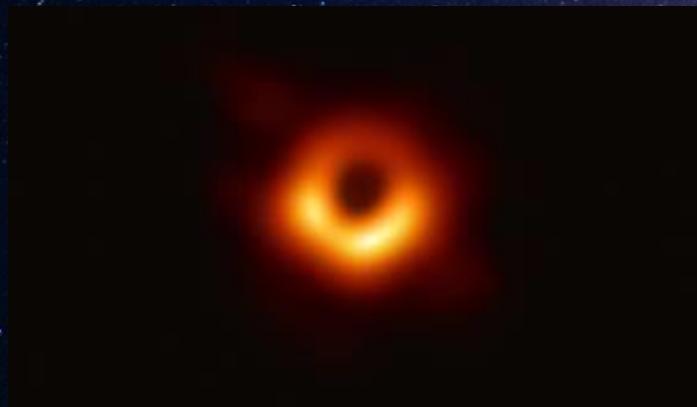
Star death

Stars die when they no longer have any energy.

When stars more than 8 times the size of our Sun die, the explosion, known as a Supernova, is brighter than a billion suns!

Stars with very huge cores continue to become smaller and smaller because of the force of gravity!

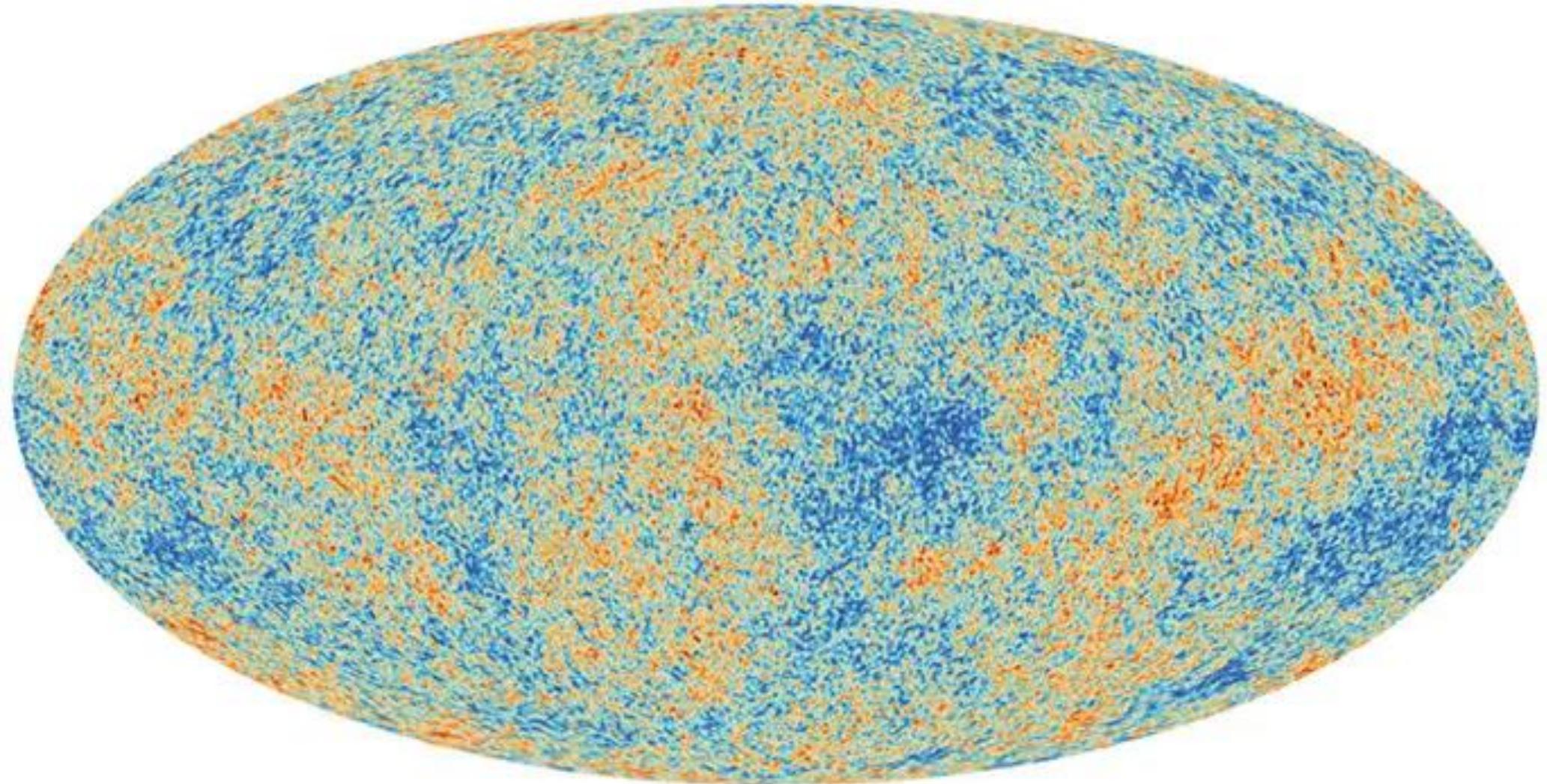
What is left is a black hole, an area of the universe so powerful it crushes anything that comes close to it, not even light can escape a black hole!



In 2019, scientists confirmed the presence of black holes in the universe

Big Bang afterglow

Remember how we said the big bang was full of energy?



Some of that energy is still around today! And it shows up as microwave radiation coming from all over the sky

