

# Universe

The early universe was very small but it contained all the matter and energy in the universe today. It was a dense and chaotic soup of tiny particles and a single force, a superforce. This original universe lasted only a split second. After just three trillionths of a trillionth of a trillionth of a second, the superforce split up into separate forces. All the universe was squeezed into an unimaginably small, hot dense ball. The Big Bang was when this suddenly began to swell explosively, allowing first energy and matter, then atoms, gas clouds and galaxies to form. After a split second Inflation began as space swelled a thousand billion billion billion times in less than a second - from the size of a football to something bigger than a galaxy!

We know that the Universe is getting bigger at a certain rate by observing how fast distant galaxies are moving. By working out how long it took everything to expand to where it is now, we can wind the clock back to the time when the Universe was very small indeed. This suggests the Universe is around 15 billion years old and measures 15 billion light years in every direction.

What happens to the Universe depends upon how much matter it contains. If there is enough, gravity will put a brake on its expansion and it may soon begin to contract again to the Big Crunch. If there is not enough matter, it may go on expanding forever. Currently about 90% of the mass of the Universe is unaccounted for!

The Big Bang made two of the elements: hydrogen and helium. All the other chemical elements, like oxygen, were made in the stars.

The solar system is centred around our own Sun, which is one of many billions of stars in our own galaxy, which is one of many billions of galaxies in the Universe.

Because light arrives on Earth billions of years after it left the most distant galaxies, we are actually viewing them as they were, all those billions of years ago. Distant objects tell us about events which took place billions of years ago. This is why it is important for astronomers to develop more and more powerful telescopes.



These two pictures, taken by the Hubble Space Telescope, show some of the most distant objects in our universe. Clusters of galaxies (picture left) and faint blue galaxies on the extreme edge of the visible universe (picture right)

