

Cosmogony

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The Big Bang Theory (The Theory of the Origin of the Universe)

Most astronomers believe the Universe began in a Big Bang about 14 billion years ago. At that time, the entire Universe was inside a bubble that was thousands of times smaller than a pinhead. It was hotter and denser than anything we can imagine.

Contrary to the name, astronomers believe that there was no explosion. The 'bubble' began to expand and the Universe that we know was born. Time, space and matter all began with the Big Bang. In a fraction of a second, the Universe grew from smaller than a single atom to bigger than a galaxy and it kept on growing at a fantastic rate. It is still expanding today.

As the Universe expanded and cooled, energy changed into particles of matter and antimatter. These two opposite types of particles largely destroyed each other. But some matter survived. More stable particles called protons and neutrons started to form when the Universe was one second old.

Over the next three minutes, the temperature dropped below 1 billion degrees Celsius. It was now cool enough for the protons and neutrons to come together, forming hydrogen and helium nuclei.

After 300 000 years, the Universe had cooled to about 3000 degrees. Atomic nuclei could finally capture electrons to form atoms. The Universe filled with clouds of hydrogen and helium gas. From these clouds, galaxies and solar systems formed.

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Evidence to Support the Big Bang Theory

Scientists are reasonably certain that the universe had a beginning. This is the basis of the Big Bang Theory. To support this argument scientists have discovered that:

- Galaxies appear to be moving away from us at speeds proportional to their distance. This observation supports the expansion of the universe and suggests that the universe was once compacted.
- If the universe was initially very, very hot as the Big Bang suggests, we should be able to find some small remains of this heat. In 1965, Radio astronomers discovered Cosmic Microwave Background radiation (CMB) which spread throughout parts of the observable universe. This is thought to be the small remains which scientists were looking for.
- Finally, the abundance of the "light elements" Hydrogen and Helium found in the observable universe are thought to support the Big Bang model of origins.

As mentioned above, the Big Bang occurred about 14 billion years ago. Scientists estimate this by:

- Looking for the oldest stars
- Measuring the expansion of the universe.

