

Q) What is the Universe? Describe its origins and the different methods to estimate its age.

DEFINING COSMOS

The Cosmos is the:

"totality of everything that exists, including all matter and energy, the Planets, stars, galaxies and the contents of intergalactic space."

(Mian Shafiq)

BIG BANG

The most leading explanation for the origin of the universe is the "Big Bang" theory. Its Proponents argue that the universe began as a single point, then expanded and stretched for 13.82 billion years (3 times older than the earth) to become as large as it is today. This view was first introduced by an astronomer, George Lemaitre, in 1927, and was later confirmed by Edwin Hubble in 1929 when he noticed that galaxies were moving away from the earth, with the farthest moving at a rapid pace than those close to earth. This method continues to be used by

Contemporary astronomers in order to determine whether an object is ~~is~~ headed towards or away from the earth and at what pace. If an object is moving away from the earth, it lights long red wavelengths, known as the redshift effect. Comparatively, if an object is moving towards the earth, it lights shorter, blue wavelengths, known as the blueshift effect. The red shift effect supports the big bang theory.

Another piece of evidence which supports the big bang theory is the findings of Arno Penzias and Wilson who detected a cosmic microwave background radiation whilst studying radio signals. These radiations are received from every bit of the Cosmos and are believed to be the left over heat from the big bang.

DETERMINING THE AGE OF THE COSMOS

1) Hubble Constant

The first method used by astronomers to estimate the age of the Universe is by measuring its expansion rate, known as the Hubble Constant. By figuring out how far an object is and the speed at which it

it is receding, astronomers have been successful at estimating the age of the Cosmos. This has been done by working backward (look-back time), all the way to the original expansion or big bang. In 2012, the age of the Universe was estimated to be ~~13.77~~ 13.772 billion years by National Aeronautics and Space Administration (NASA) whereas a year later, it was estimated to be 13.82 billion years by The European Space Agency.

2) Oldest stars

The second ~~way~~ method used by scientists to measure the age of the Universe is to look at the oldest stars as the Cosmos cannot be younger than them. Thus, astronomers turn to the ~~or~~ very first stars to have been formed in the Universe, and determine their mass to figure out when they formed and thereby, what the age of the Universe is. NASA reveals that because the oldest globular clusters contain stars with 0.7 times less mass than the Sun, they are 11-18 billion years old.