Cosmology

Summary

http://quantumspotacademy.org/videos/cosmology/

When physicists observed galaxies moving rapidly away from our own, they conjectured that the universe itself was expanding. They reasoned that about 14 billion years ago, the universe must have been very small, possibly a single point. According to this theory, called the Big Bang theory, the universe originated in a rapid expansion.

The Big Bang theory predicts a radiant energy permeating the universe, which was accidentally discovered in 1965. Much more evidence has corroborated the Big Bang theory and it is now regarded as the most accurate theory of universal origins.

The period of rapid expansion after the Big Bang cooled the plasma, forming small atoms. Gravity pulled the atoms together into stars, the stars clumped together to form galaxies, and the galaxies formed clusters. All larger chemical elements are produced by stars when they die in an explosion called a supernova. The expelled matter from a supernova formed the earth and other planets.

Physicists conjecture that dark matter helps hold galaxies together. Dark matter is made of weakly interacting massive particles (WIMPs) and may make up over 80% of the matter in the universe.

Physicists describe the universe as a four-dimensional continuum called space-time. Matter and energy warp space-time and the resulting geometry of space-time affects the movement of local matter and energy. We call this effect gravity.

The three possible cosmological geometries are closed, open, and flat. These possibilities have implications regarding the future of the universe. A closed geometry would collapse in the Big Crunch. An open geometry would accelerate, possibly tearing all matter apart in the Big Rip. A flat geometry would continue to expand forever, avoiding the Big Crunch and the Big Rip. Even if the universe avoids the Big Rip and the Big Crunch, it will eventually be destroyed by a gradual decay called the Big Freeze.

Physicists conjecture that "dark energy" causes the universe's expansion. Dark energy makes up about 71% of universe's constituents, while dark matter makes up another 24%, leaving just 5% for normal matter.