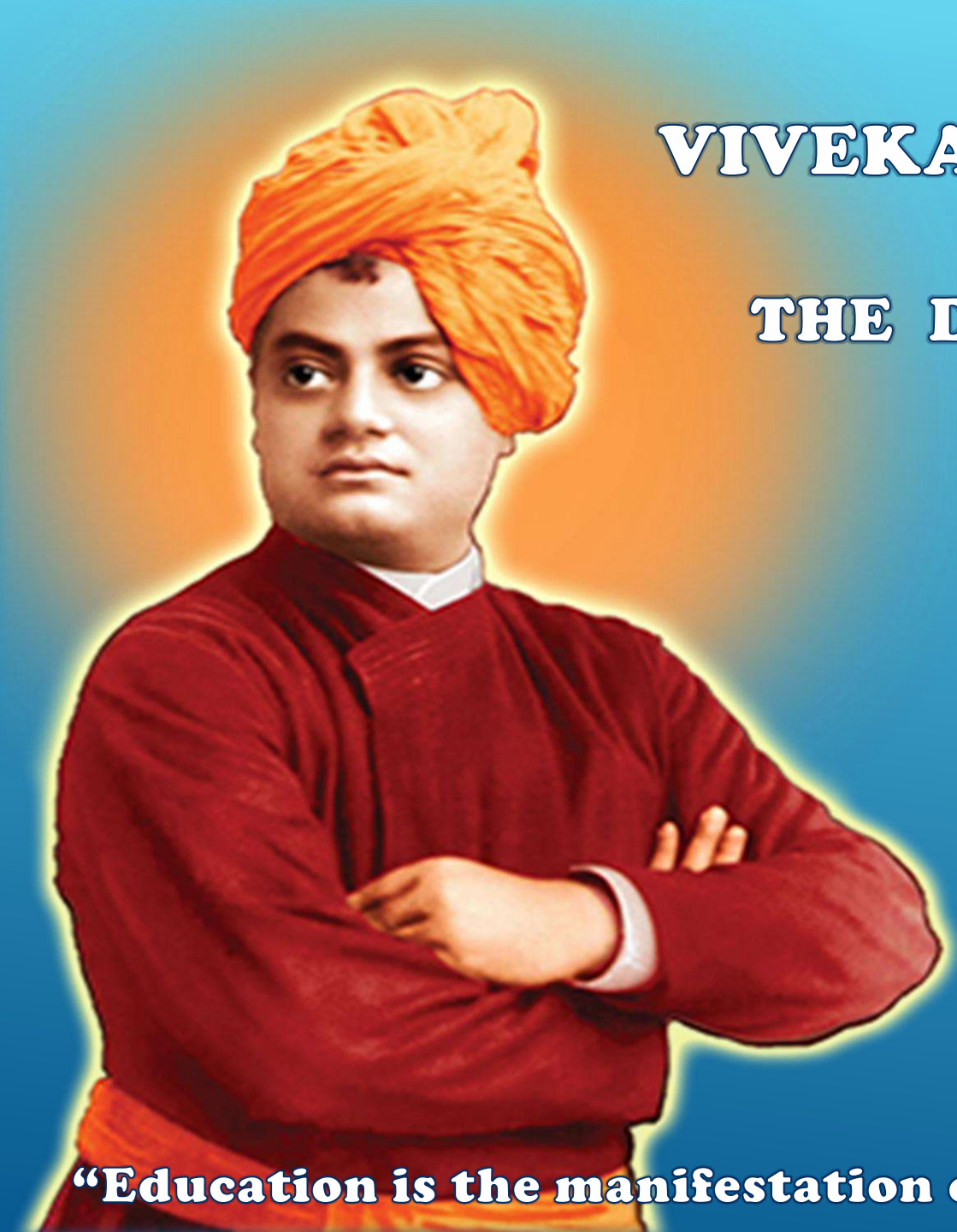

VIVEKANANDA COLLEGE, KOLKATA

THE DEPARTMENT OF GEOGRAPHY

COURSE MATERIAL
FOR
HONOURS IN GEOGRAPHY

"Education is the manifestation of the perfection already in man" - Swamiji

The Big Bang Theory

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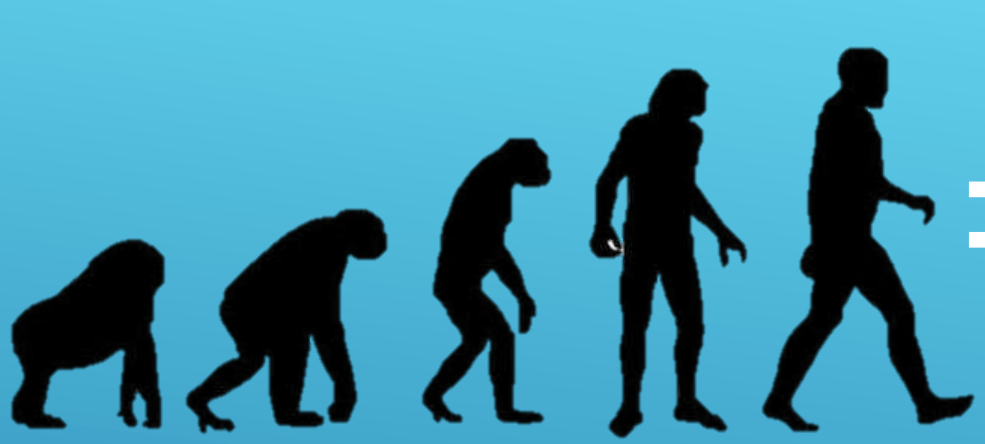

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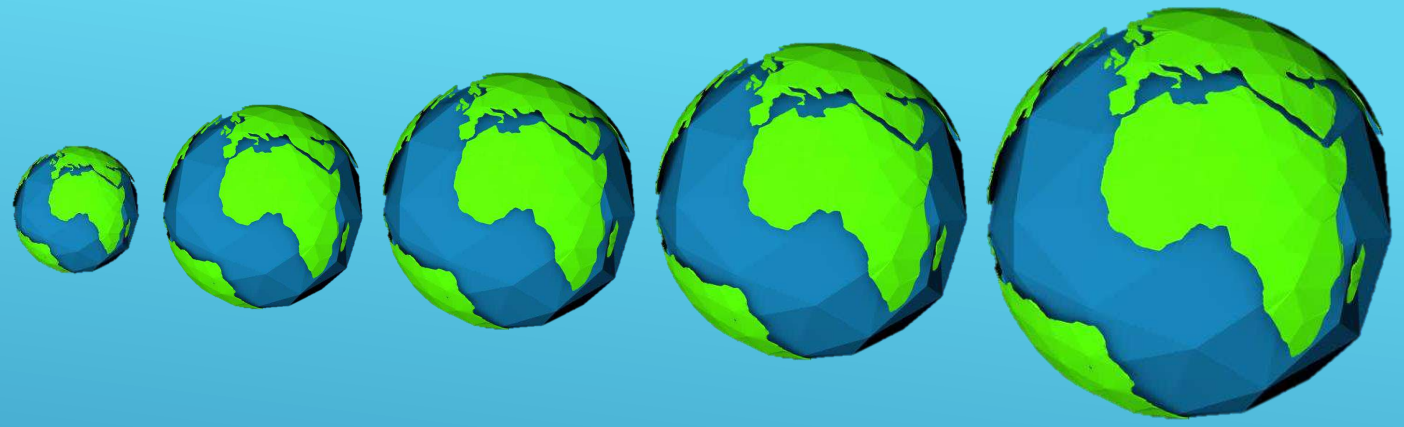
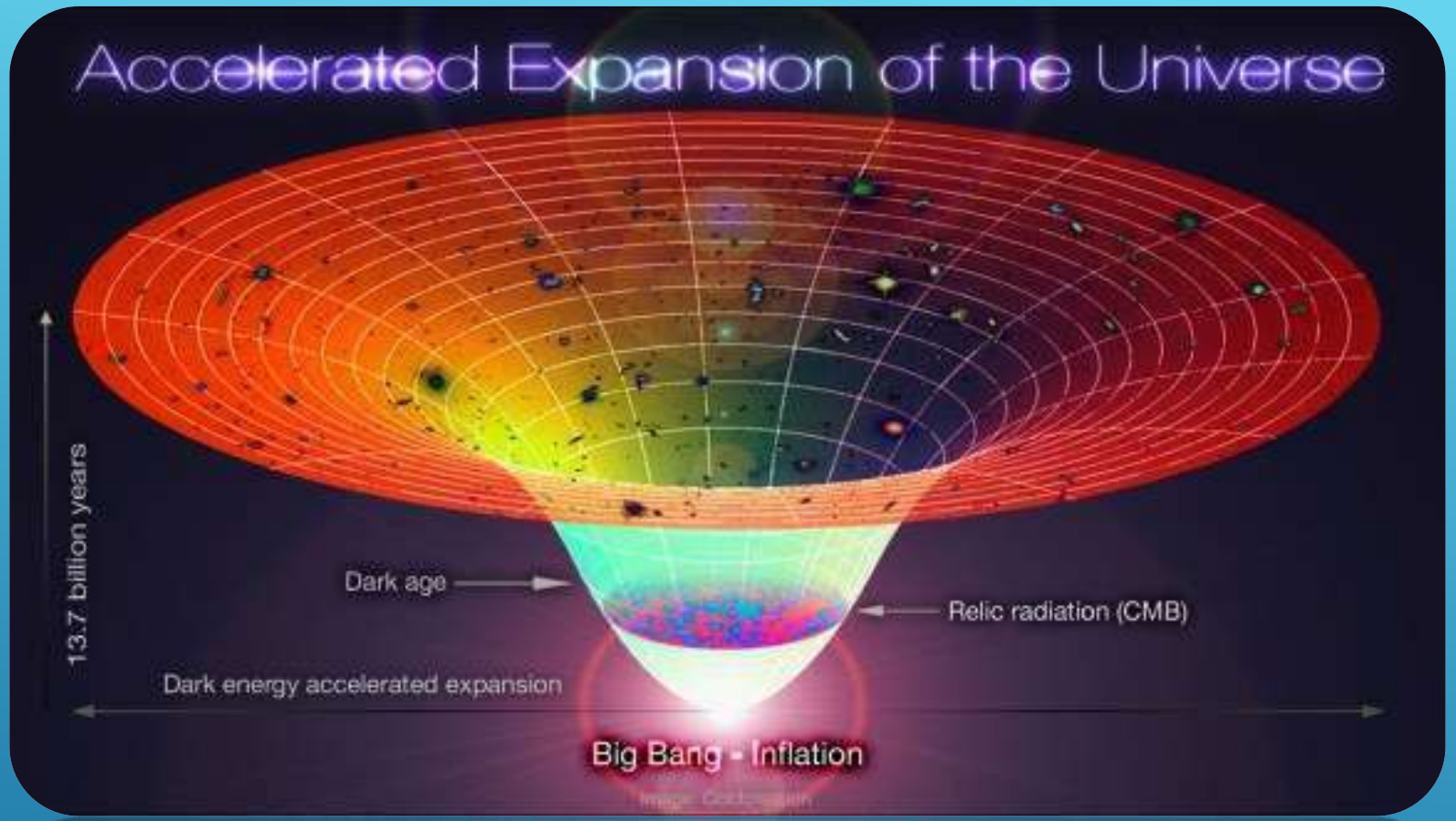
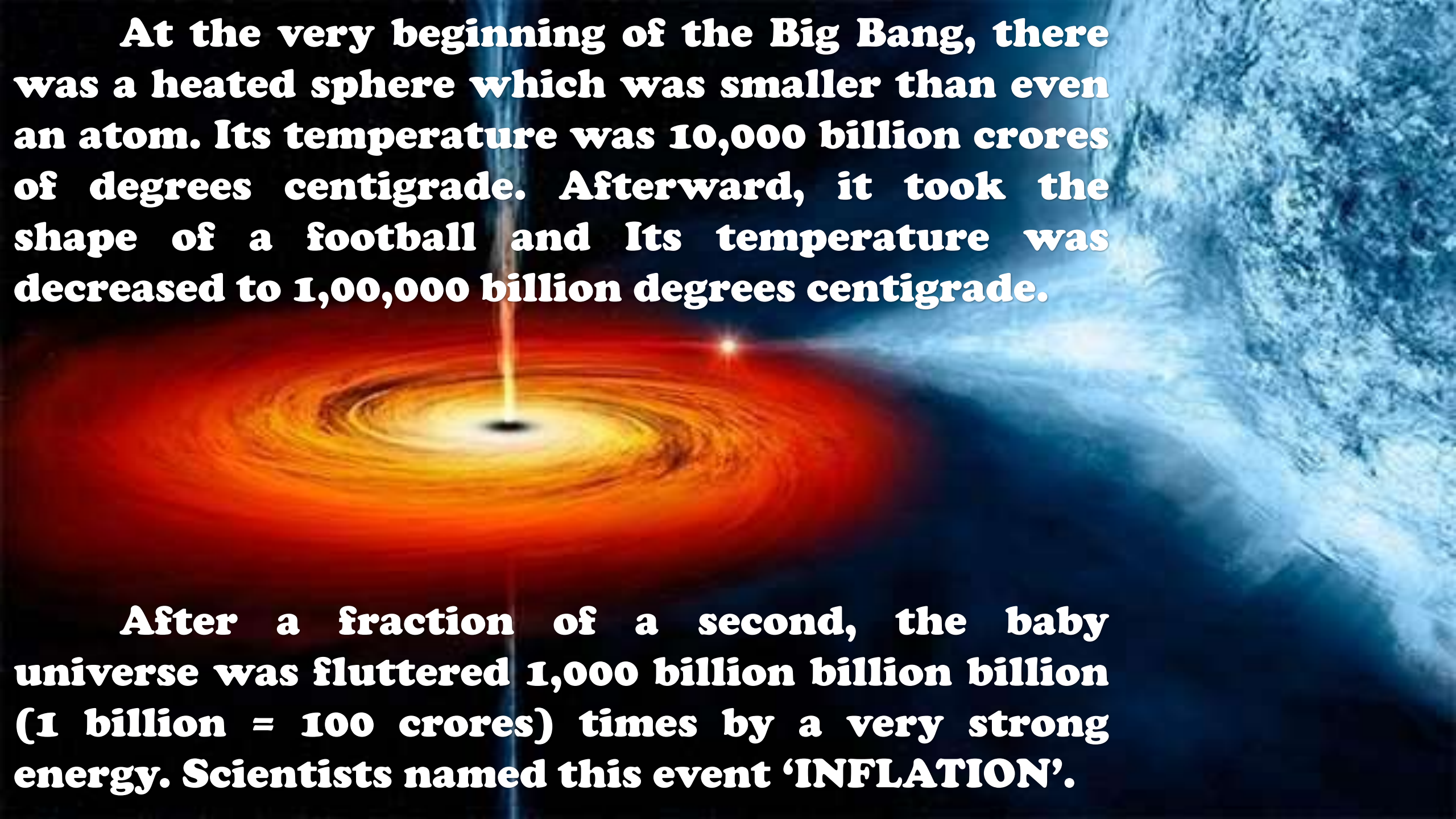


The universe is all about matter, energy, space and time. Its vast majority is empty. There are some accumulated substances and energy scattered within. Components of this accumulated substance and energy compared to the vacuum are minimal. Scientists believe that the universe is roughly 1,500 billion years old. It had been initiated from a big explosion titled 'BIG BANG'.

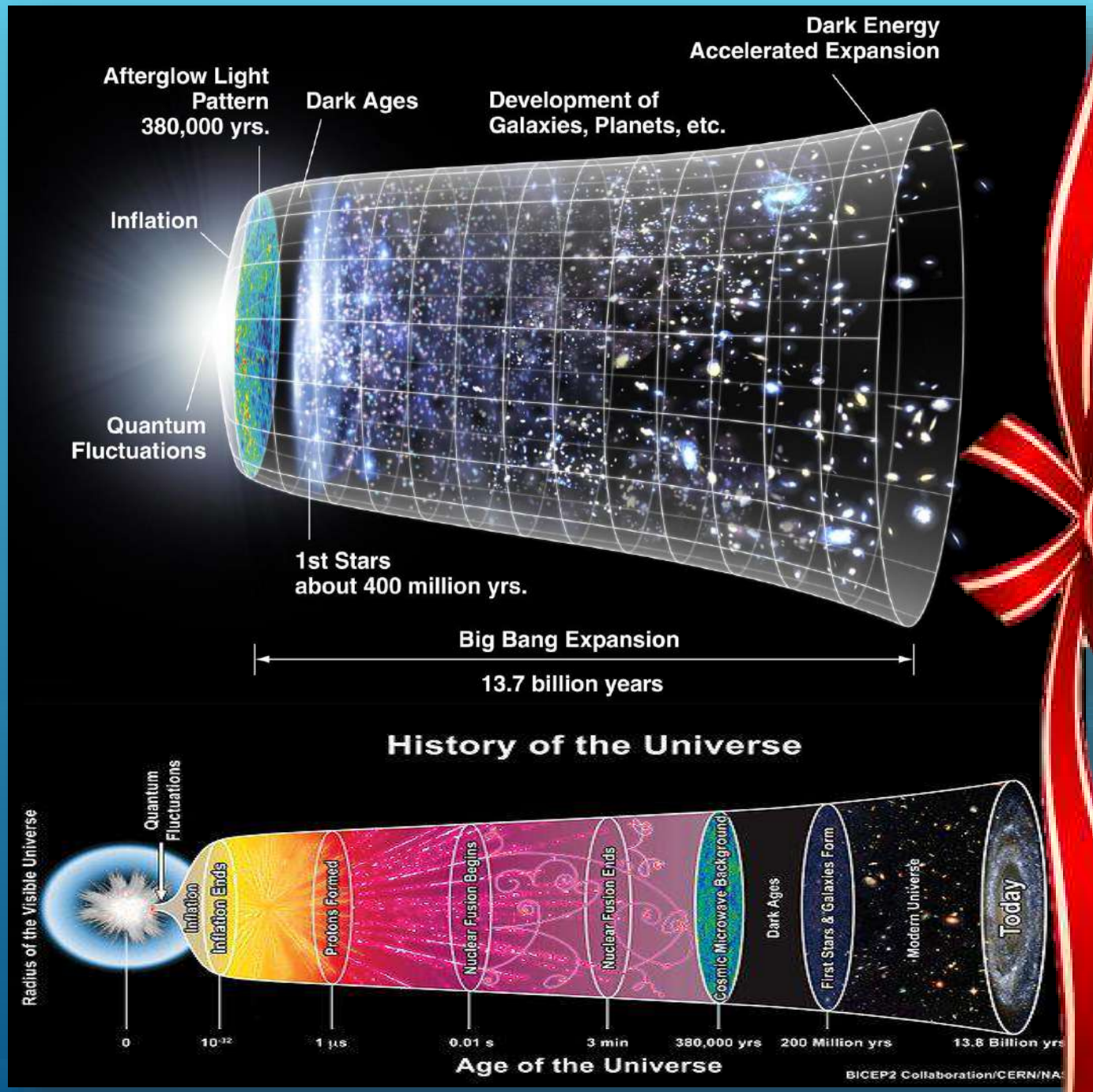


Although the Big Bang was lasted only a fraction of a second, yet the energy and the materials were spread all over since the explosion was so strong. If anything happens before the Big Bang, then it is impossible for anyone to say that what it was exactly.

At the very beginning of the Big Bang, there was a heated sphere which was smaller than even an atom. Its temperature was 10,000 billion crores of degrees centigrade. Afterward, it took the shape of a football and Its temperature was decreased to 1,00,000 billion degrees centigrade.

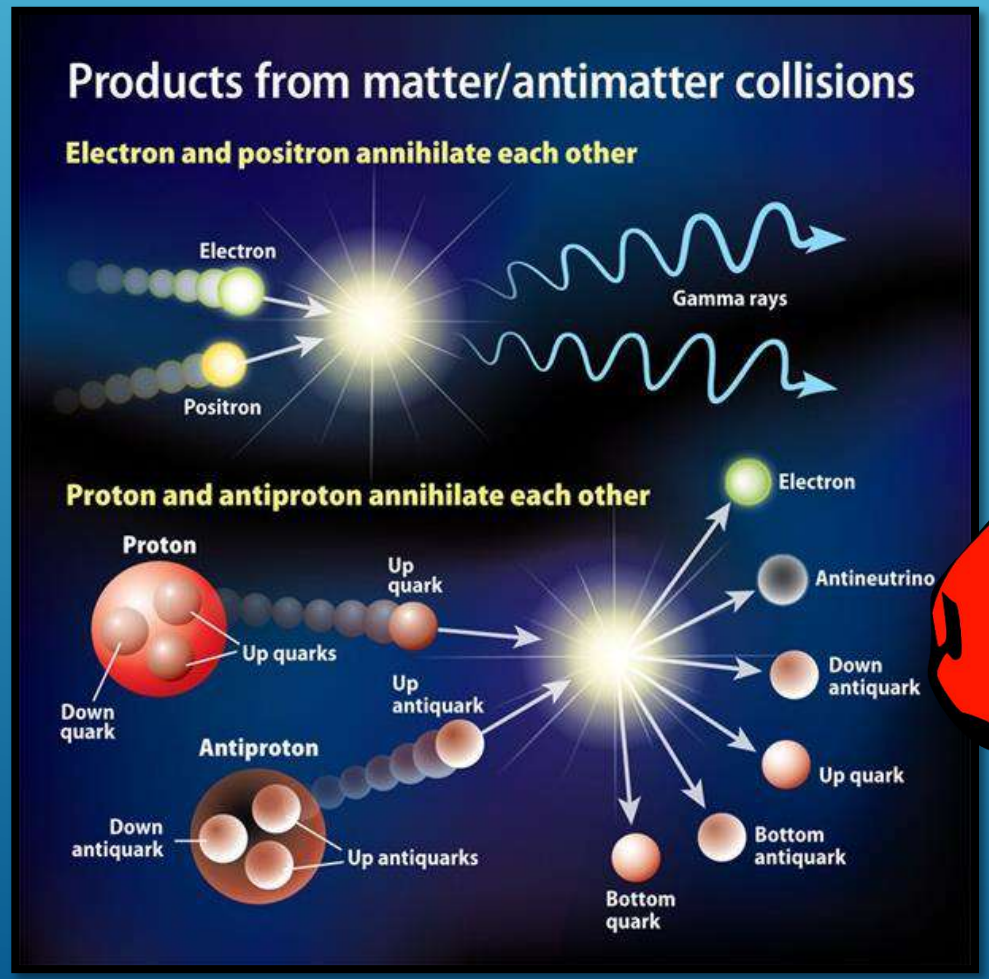


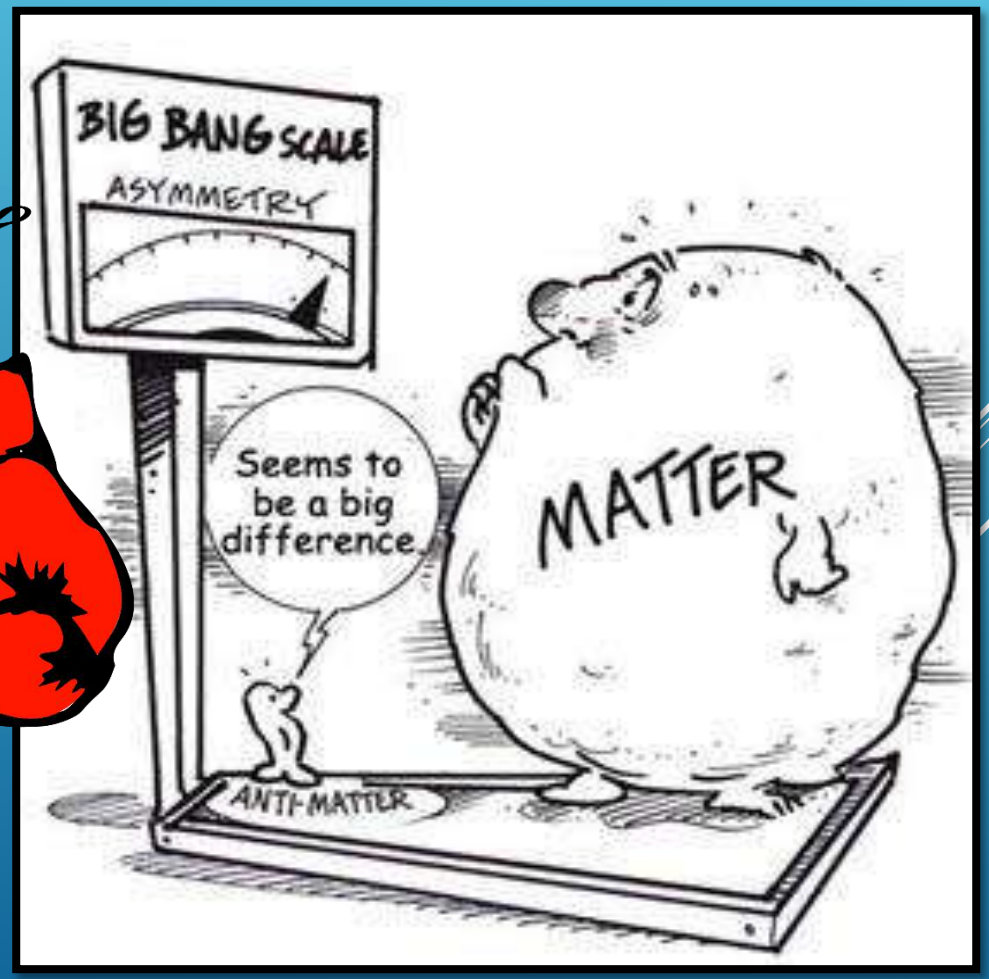
After a fraction of a second, the baby universe was fluttered 1,000 billion billion billion (1 billion = 100 crores) times by a very strong energy. Scientists named this event 'INFLATION'.

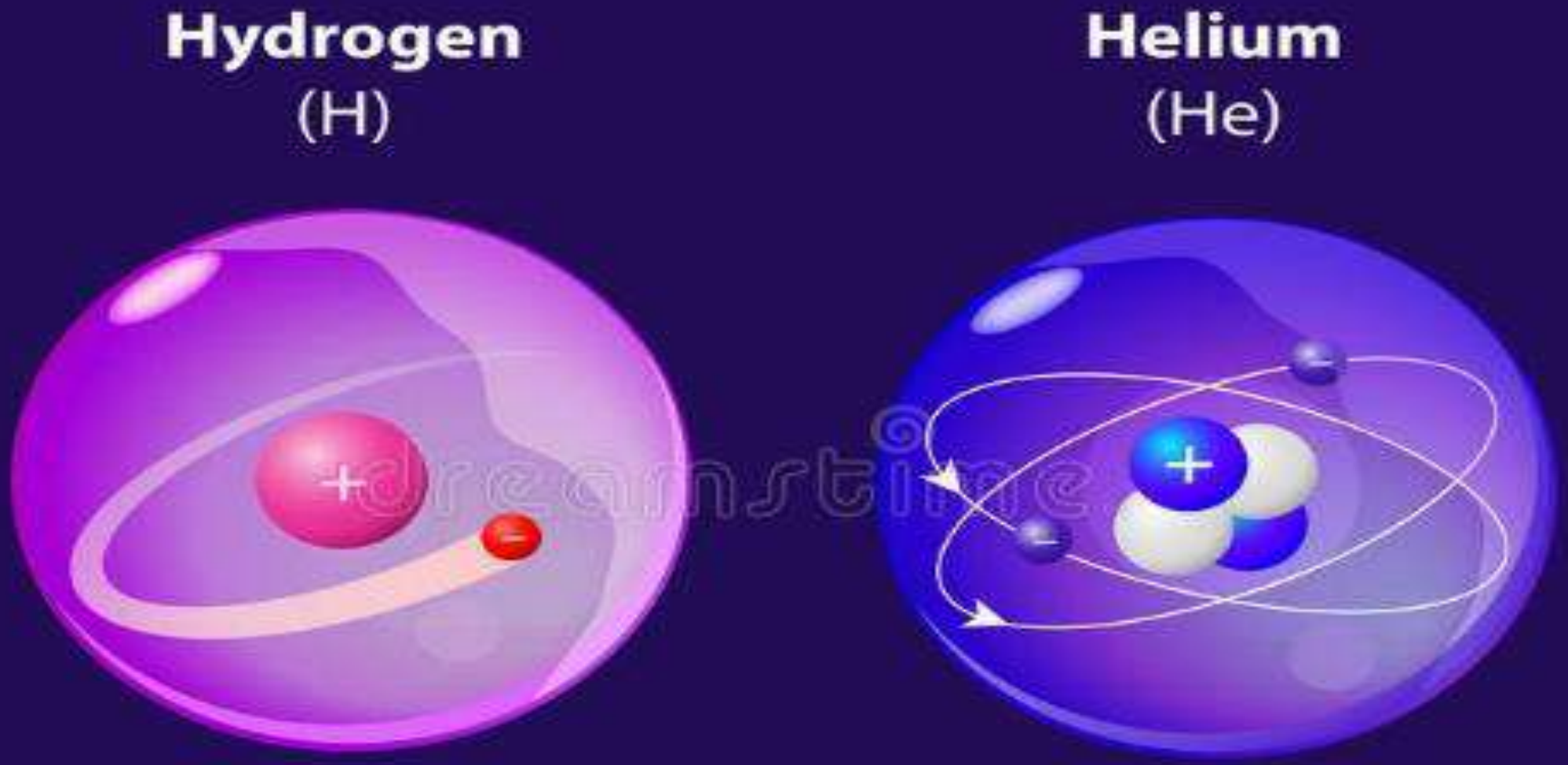


The universe that grew rapidly was flooded by the power and the flood of substances and that very strong energy was divided into different types of electromagnetic, gravitational forces and so on. At the beginning, there was no atom, rather there were only a few smaller particles, namely the 'quark'. The density of the substances made by this quark was a trillion trillion trillion trillion trillion times denser than water (1 trillion = 10^{12} = 10,000 crores).

There was the existence of the antimatter too which is a kind of reflection of the matter. Antimatter and matter are destroyed when they come in contact with each other. The matter won by the end of this war, but this was caused most of the universe to become empty.

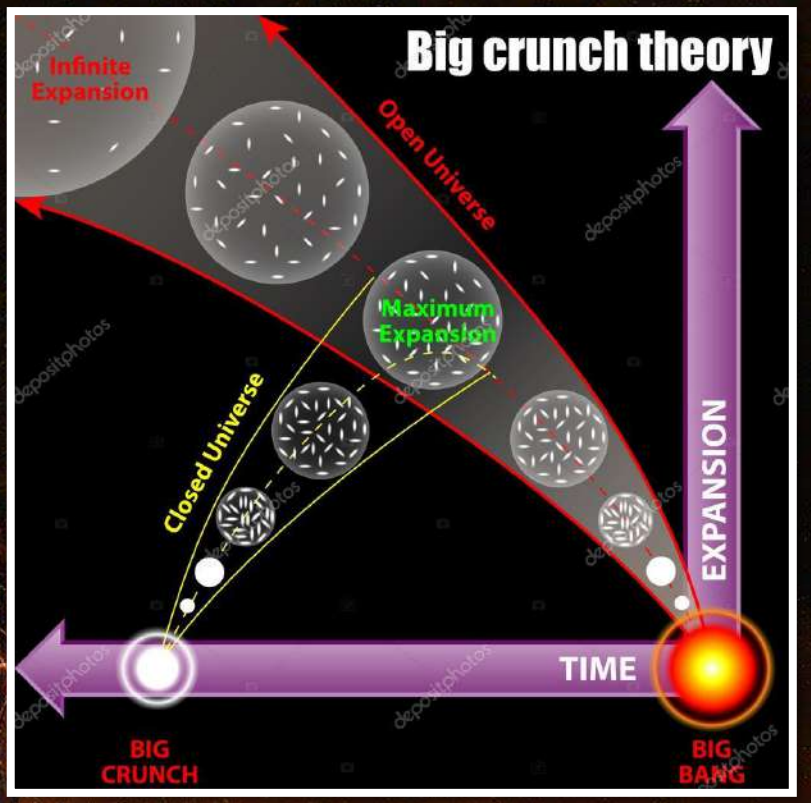






After about three minutes, at the outset, the quarks were started to be added and became the smallest atoms of hydrogen. Afterward, the hydrogen atoms again were added and formed the atoms of helium gas.

Ten million years later, gases began to get concentrated. So many empty spaces were there. Twenty-two billion years later, firstly the cloud were created from the concentrated elements and afterward the star and the galaxy were created from the same. The bright glow of Big Bang's is noticed even today from the microwave background radiation coming from all directions in the sky.

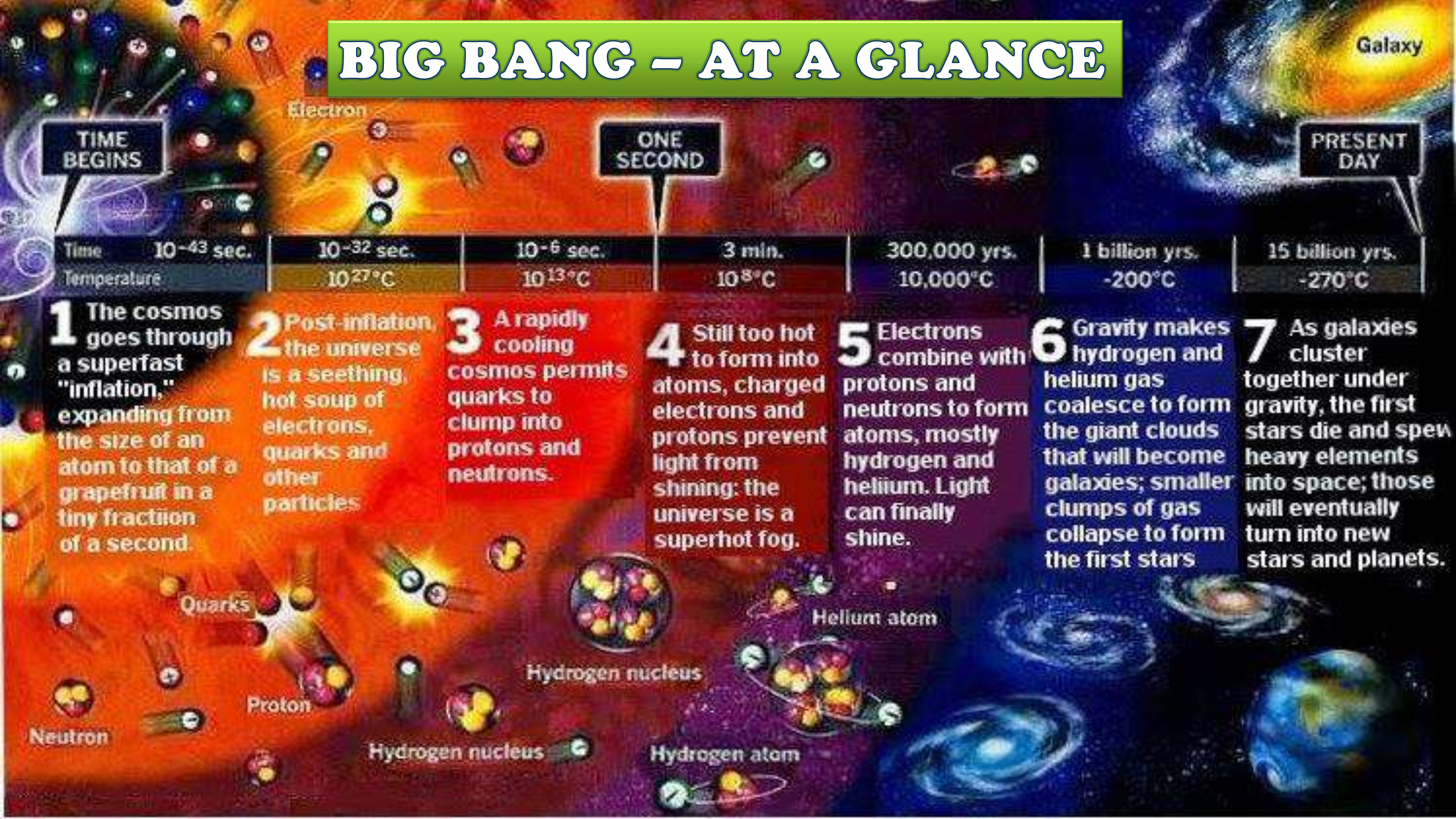


With the expansion, all the galaxies in the universe are moving away from each other. It is not known whether this trend will continue for eternity. If the growth stops and the universe starts to contract then the galaxies will run again towards each other and will make a big crunch. Or there maybe another big bang would be the beginning of a new universe. Since the scientists believe that both the space and the time had been started with the Big Bang as well that's because there was no existence of the concept of time probably before the Big Bang.

THE HISTORY OF THE UNIVERSE

Time after Big Bang	Era	Description
10^{-43}	Planck	The temperature and pressure were so high that scientists were not able to get the correct idea about this condition.
10^{-6}	Hadron	Proton and neutron were made from the quarks within the force of the fire.
1 Second	Radiation	Hydrogen and helium atoms were first produced by cooling down the fire.
30,000 Years	Substance	At that time the substance was got preference instead of radiation.
3,00,000 Years	Era of Disconnection	At that time, interactions between particles and radiation were stopped. The back radiation starts to cool down.
10 Million Years	Origin of Galaxies	From a type of ripple, the substances present in the universe took the shape of the galaxy.
100 Billion Years	Origin of Stars	The stars and galaxies begin to emanate, the origin of the material begins. Planets and humans are created with these basic materials.

BIG BANG – AT A GLANCE



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