

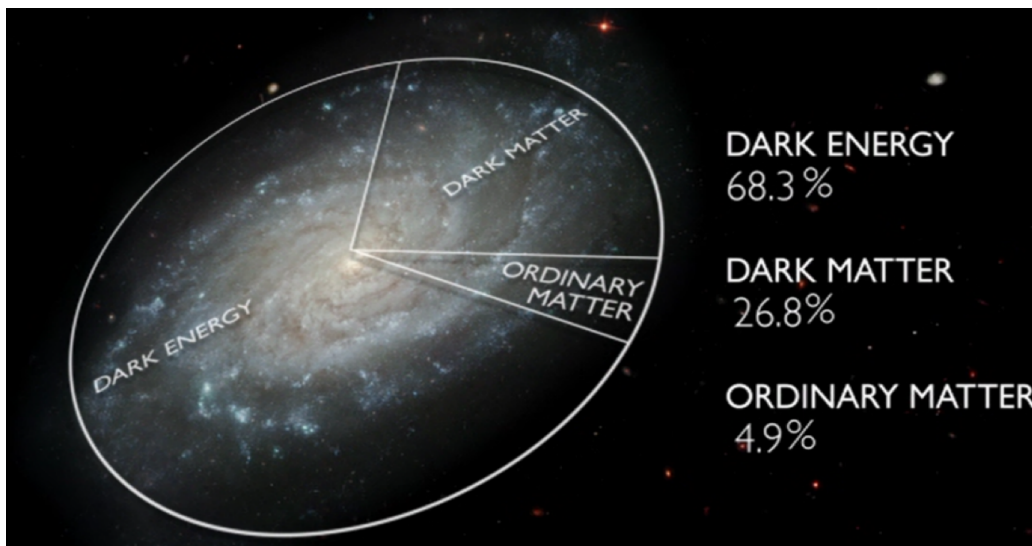


Cosmic Microwave Background (CMB)

On May 20, 1964, American radio astronomers Robert Wilson and Arno Penzias discovered the cosmic microwave background radiation (CMB) – Nobel Prize 1975. The oldest light in the Universe is the CMB, the only source that comes to us from all the areas of the sky. It was discovered accidentally 1964 in NJ – while measuring radiations that may harm satellites

This background should be isotropic and definitely it should not be related in any way to us the discovery of a universal background radiation by Penzias and Wilson is very important. This radiation is uniformly distributed throughout the universe, which means that it had to occur at or near the Big Bang itself. By measuring the temperature of the radiation, we not only verify the Big Bang, but can calculate the age of the universe. The 2.7 ° Kelvin (above absolute zero) temperature points to a universe which is approximately 13.8 billion years old. This is also confirmed by more recent data from the two COBE satellites , the WMAP (2003) satellite, Sloan (2008) satellite, and the Planck satellite (2013).

WHAT IS THE UNIVERSE MADE OUT OF?



The three major components of mass-energy (approximate values):

- Visible Matter @ 4.9%
- Dark Matter @ 26.8% -
- Dark Energy @ 68.3%

Note: The word “dark” means “unknown” has nothing to do with color. It means that it is unknown what “it is made of.” Physicists give it that name.

Visible Matter

Approx. 4.9% of the mass-energy in the universe. Visible matter emits and absorbs light (unlike dark



matter), and is constituted by the following four forces:

- Electromagnetic Force - This is the source of all electrical activity. It attracts and repels charges which creates force that can move things, change things and create light and heat.
- Strong Nuclear Force - This force only becomes active when protons are extremely close to one another, and when it does become active, it overcomes the repelling force of two similarly charged protons, giving rise to an explosion (which is the basis for an atomic - fission - bomb). This is a major source of power for our sun.
- Weak Force - This is the source of radioactive decay and particle decay which results in radiation. We will later see how this force is responsible for the way our universe developed.
- Gravitational Force - This is the force of attraction between bodies in our universe. The greater the mass and the closer the proximity among these bodies, the greater the gravitational force. Since the time of Einstein, we no longer consider gravity to be a force (as Newton did). Today we know the effects of gravitation are produced by the curved geometry of the space-time continuum. The greater the curvature, the stronger the gravitational effect. Greater density of mass-energy causes greater curvature of the space-time continuum.

Dark Matter

Makes up approx. 26.8% of the mass-energy of the universe. It is similar to visible matter in that its density causes curvature in the space-time continuum, giving rise to gravitational attraction. The combined effects of visible matter and dark matter keep our galaxies from flying apart -- even as the universe is expanding at an amazing rate. Since the density of both visible matter and dark matter is much higher inside galaxies than outside of them (in intergalactic space), the gravitational attraction holds the galaxies together while the space between them stretches and grows quite rapidly.

Dark Energy

Approx 68.3% of the mass-energy of the universe. It is, by a wide margin, the largest single component in our universe. It gives rise to a force of repulsion within the spatial continuum which causes our universe to expand at an accelerated rate.

THERE MUST BE LAWS EXISTING FOR THE BIG BANG TO HAPPEN

Vilenkin:

In this video clip, Dr. Vilenkin explains: The universe has a specific and a certain beginning, this beginning mandates the existence of Laws, and he raises the question: “Where do these laws come from?, I would like to know.” (Pay attention to this statement at the very end of the video)

<https://www.youtube.com/watch?v=PSESZR3wC8s>

These are difficult Physics concepts but are being conceptually explained here. Dr. Vilenkin describes the occurrence of the BIG BANG in 3 stages:



1 - Stage 0 to Stage 1

Two Laws must exist prior to the Big Bang happening. These Laws can cause “The nothing” before the Big Bang to become “Vacuum.” These two Laws are:

- A - The Law of Conservation of Energy: Every positive energy source must be associated with a source of equal negative energy.
- B - The Law of Conservation of Neutrality: That there is no positive charge particle existing without an equally negative charge particle.

These are Laws that have to exist before anything comes into existence. Under these laws a state of “Vacuum” can be generated.

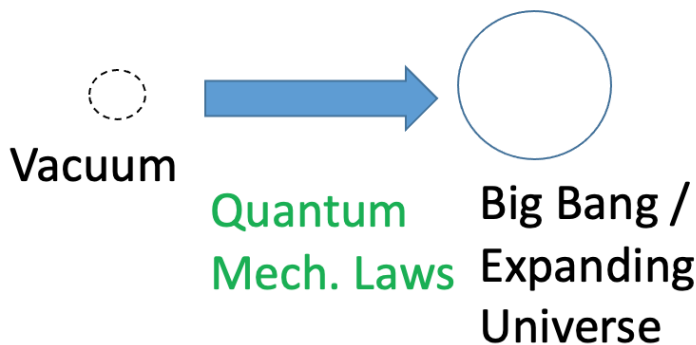


Stage 0

Stage 1

2 - Stage 1 to Stage 2:

In the presence of the previous Laws, this Vacuum can become matter, this hypothesis is satisfied by a field in Physics called “Quantum Mechanics” (which cannot be covered here). The hypothesis says that this Vacuum can “Tunnel Through” an energy barrier to become “matter”. This matter is the “seed” of the Big Bang.



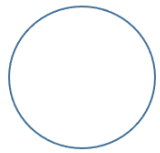
Stage 1

Stage 2



3 - Stage 2 to Stage 3

After the Big Bang that Galaxies move further from one another, and the planets are formed. Our galaxy is called the Milky Way Galaxy. The planets rotate around the Sun.



Big Bang /
Expanding
Universe

Finely-tuned Planet
Earth

Stage 2

Stage 3

Laurence Krauss contradictions:

- Laurence Krauss is a Physicist and an author.
- Laurence Krauss asserts his claims as the “Universe coming out of Nothing” to remove any possibility of a Creator : “The dominant stuff of the universe is “nothing” and we do not understand it.” Making the read
- But Laurence Krauss modifies it or qualifies this “nothing” and states: “nothing is not really nothing but infinite particles that pop in and out of existence on a time-scale so short that you cannot actually see them. You might say if you cannot see them and pop in and out of existence then it is not physics it is philosophy. Although we cannot see them directly but they do have an impact on atoms and the structure of atoms”
- According to Laurence Krauss himself Nothing is: **Nothing plus Energy and the law of gravity**
- Wait a minute: THEN THERE IS SOMETHING – The Laws of Energy or Gravity – It does not matter what you call them but we have to ask “**where did these Laws come from**”. So even Laurence Krauss himself admits that Nothing is not really nothing.
- In his book “Universe out of Nothing” He shifts the focus from “why” the Universe is existing, to “how” the Universe came into existence. This is a trick to shift the focus away from the Ultimate meaning of the Existence of the Universe, and “why” it came into existence to “how” it was created.