



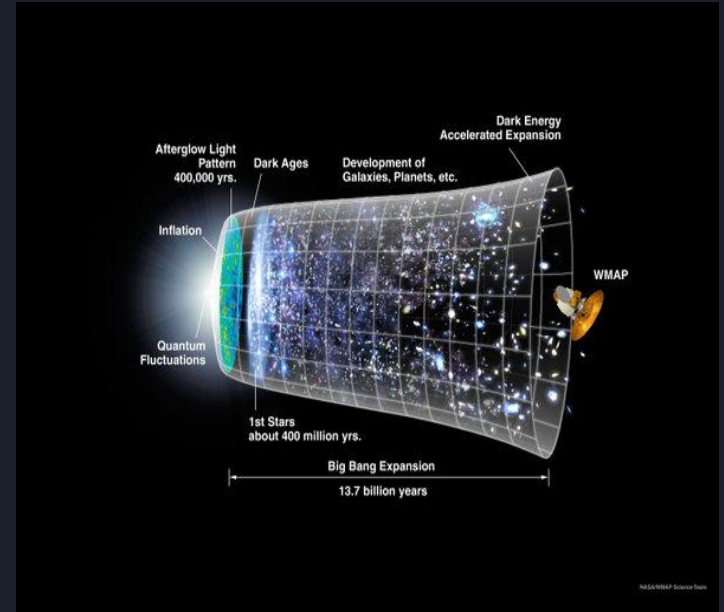
What Makes the Big Bang Theory the Most Widely Accepted Theory Among Scientists?

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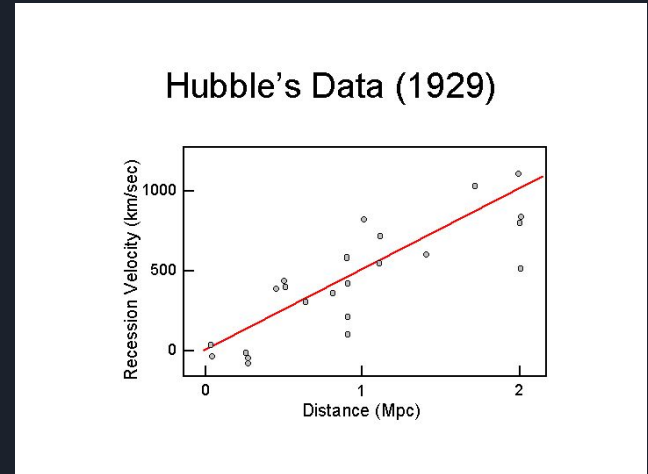
What is the Big Bang?

- Definition: the Big Bang theory is a theory in astronomy: the universe originated billions of years ago in an explosion from a single point of nearly infinite energy density
- the universe went from being fractions of an inch (a few millimeters) to what it is today
- According to the Big Bang theory, the universe was born as a very hot, very dense, single point in space.



Who first discovered the Big Bang

- In 1926 Edward Hubble discovered an odd fact: Almost every galaxy he observed appeared to be moving away from the Earth
- He knew this was true by studying how the light coming from the galaxies exhibited redshift .
- The light waves get stretched by the expansion of the Universe on their way to Earth which shifts visible light toward the red end of the spectrum.
- Hubble and his assistant studied the red shifts and by 1929 they had formulated what became known as Hubble's Law

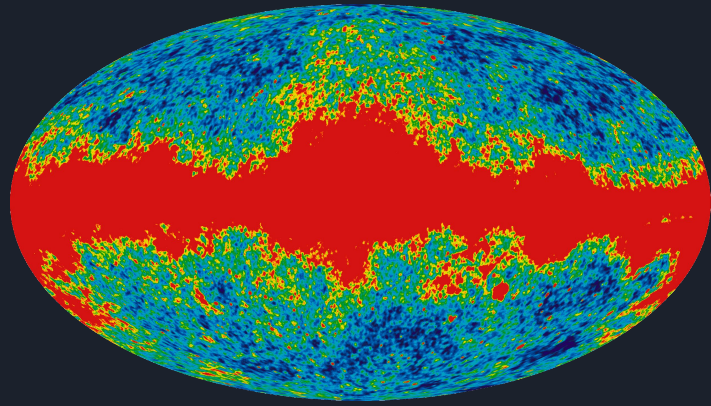




Cosmic Background Radiation

- The cosmic background radiation is the afterglow of the Big Bang
- A second after the Big Bang we would see is a 10 billion degree sea of neutrons, protons, electrons, anti electrons, and photons and as the universe cooled the electrons combined with nuclei to make neutral atoms
- Before this recombination occurred the universe would have been opaque because the free electrons caused the photons to scatter, but once they were absorbed into atoms the photons didn't scatter and the universe became transparent.

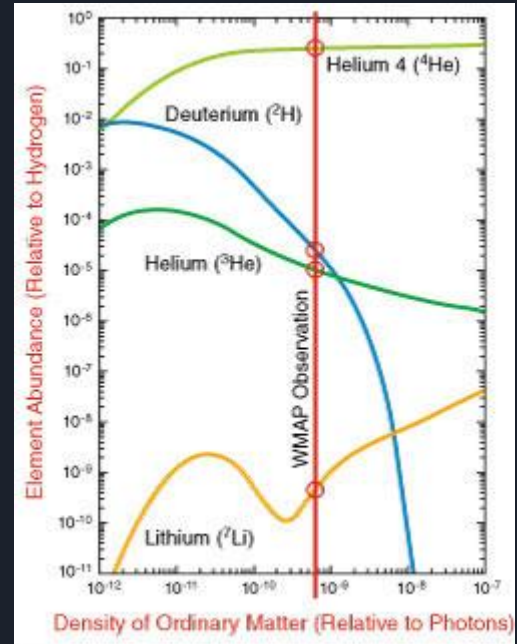
COBE and WMAP



- NASA launched two missions to study cosmic background radiation , taking “baby pictures” of the universe only 400,000 years after it was born
- The first was the cosmic background explorer (COBE) in 1992 and it mapped the primordial hot and cold spots in cosmic background radiation, which are related to the gravitational field in the early Universe and form the seeds of the giant clusters of galaxies that stretch hundreds of millions of light years across the Universe
- The second mission to examine the cosmic background radiation was the Wilkinson Microwave Anisotropy Probe (WMAP). With greatly improved resolution compared to COBE, WMAP surveyed the entire sky, measuring temperature differences of the microwave radiation that is nearly uniformly distributed across the Universe.

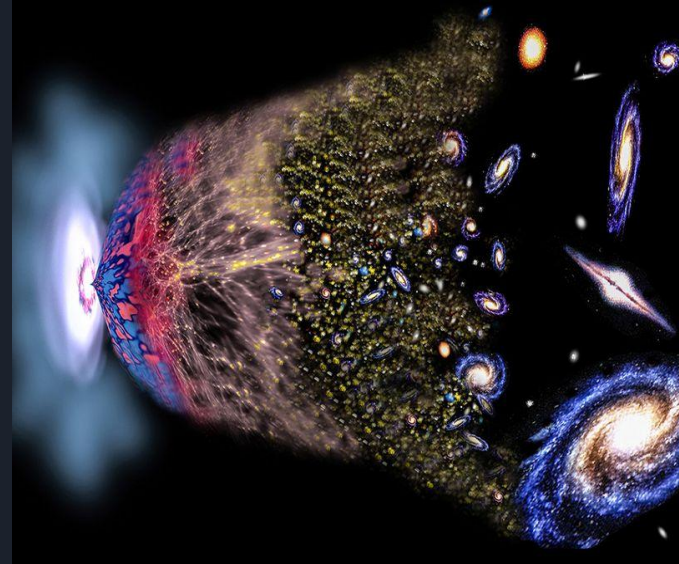
Big Bang Nucleosynthesis

- Big Bang nucleosynthesis (BBN) is the process of light element formation in the early universe
- As the universe cooled, the neutrons either decayed into protons and electrons or combined with protons to make deuterium (an isotope of hydrogen)
- During the first three minutes of the universe, most of the deuterium combined to make helium.
- Trace amounts of lithium were also produced at this time
- This graphs results indicate that the produce of helium is relatively larger than the quantity of ordinary matter, above a certain threshold



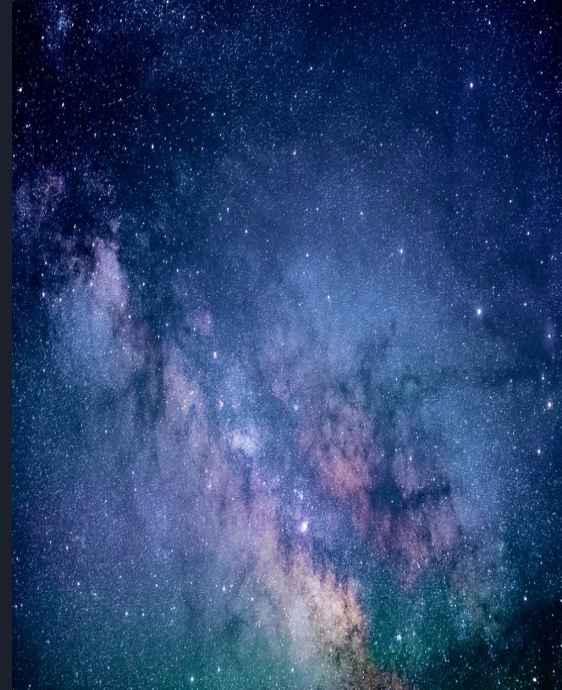
Common Misconceptions

- Many people believe the Big Bang theory was an explosion but scientist have proven it was actually an expansion
- The Big Bang was not an explosion that occurred at some point in space and time. It was an explosion of space and time. Time did not exist before hand
- We also tend to image it as a little fireball appearing in space but according to experts space didn't even exist prior to the Big Bang. The singularity didn't appear in space, space began inside of the singularity. Prior to the singularity, nothing existed, not space, time, matter, or energy.



Other Theories

- We are in a digital simulation that is running on a computer
- One alternative theory is the Steady State universe. It's the theory that there is continuous creation of matter throughout the universe to explain its apparent expansion. This type of universe would be infinite, with no beginning or end. However, it was proven false as the observational evidence points to a hot Big Bang cosmology with a finite age of the universe, which the Steady State model does not predict.
- Another alternative is the Eternal Inflation theory. After the Big Bang, the universe expanded rapidly during a brief period called inflation. The Eternal Inflation theory posits that inflation never stopped, and has been going on for an infinite length of time. Somewhere, even now, new universes are coming into existence in a vast complex called the multiverse. Those many universes could have different physical laws.



The future of the universe

- Through telescopes we can look back through the history of our universe and see some of the very first celestial objects that were birthed from the Big Bang and we can also predict the future
- We can determine the rate at which the universe is expanding, see stars be born and die in equal proportions, detect changes in the atmosphere of distant exoplanets, and so much more.
- due to the accelerating expansion of the universe, the sky we're observing today will look radically different from the one that'll exist in a few trillion (or even billion) years.
- cosmologists envision two possible fates for the universe: either endless expansion or the "Big Crunch"

