

Timeline of the Universe

TIME SINCE THE BIG BANG	TEMPERATURE (K)	ERA	KEY EVENTS	
0 - 10^{-43} s	undefined	Planck	The Big Bang occurred and the Universe came into existence. Current theories can't describe the Universe during the time between the Big Bang and 10^{-43} s (Planck era) because the Universe was dominated by quantum gravitational effects, and we do not yet have a quantum theory of gravity	
10^{-43} - 10^{-35} s	10^{32}	GUT	As the Universe expanded and cooled, gravity separated from the strong, electromagnetic and weak interactions (Grand Unified theory era).	
10^{-35} - 10^{-12} s	10^{27}	inflation	The strong interaction separated from the electromagnetic and weak forces causing the Universe to expand by a factor of 10^{25} in 10^{-32} s (inflation era). It ended when part of the energy was transformed into matter.	
10^{-12} - 10^{-6} s	10^{15}	quark	radiation-dominated era The electromagnetic interaction separated from the weak interaction, giving us the four fundamental interactions we know today. Gravity began to control the expansion of the Universe. Quarks, leptons and their anti-particles formed (quark era). Leptons separated into electrons, neutrinos and their anti-particles. The quark era ended when most matter and anti-matter particles annihilated each other, leaving a slight excess of matter to populate the future Universe.	
10^{-6} - 1 s	10^{13}	hadron		The Universe had cooled sufficiently for quarks and anti-quarks to combine and form protons, neutrons and their anti-particles (hadron era). Protons and anti-protons; neutrons and anti-neutrons annihilated each other leaving a slight excess of protons and neutrons.
1 - 10 s	10^{10}	lepton		The Universe had cooled to the point where no new lepton/anti-lepton pairs were created. Most leptons and anti-leptons annihilated each other (lepton era), leaving a slight excess of leptons (equal to the number of protons, making the net charge of the Universe zero) Neutrinos and anti-neutrinos no longer interacted with protons and neutrons, so the Universe became transparent to neutrinos.
10 s onwards	10^{10} - 10^9	photons	After the lepton era, the Universe was dominated by photons, which interacted with protons, electrons and eventually nuclei, and continued to do so for the next 300,000 years (radiation era).	
3 - 20 min	10^9		The Universe cooled to the point where protons and neutrons began fusing to form helium and deuterium nuclei (nucleosynthesis), using up all spare neutrons. However, the temperature and density of the Universe soon fell to the point where fusion couldn't continue.	
300 000 - 380 000 yr	3 000	matter-dominated era	Hydrogen and helium nuclei captured electrons into orbits around them to form stable, neutral atoms. Photons no longer interacted with charged particles, so the Universe became transparent to them. These photons are still evident today in the cosmic microwave background radiation (CMBR).	
10^9 yr			The first stars were formed 100–200 million years after the Big Bang. The first galaxies were formed 1 billion years after the Big Bang. Heavy elements were created in supernova explosions.	
8.4×10^9 yr			The Sun and Solar System were formed.	
13.7×10^9 yr	3		Humans appeared on Earth.	