**THE UNIVERSE**

The **universe** is all of [space](https://en.wikipedia.org/wiki/Space" \o "Space) and [time](https://en.wikipedia.org/wiki/Time" \o "Time)[[a]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-spacetime-10) and their contents.[[10]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-Zeilik1998-11) It comprises all of [existence](https://en.wikipedia.org/wiki/Existence" \o "Existence), any [fundamental interaction](https://en.wikipedia.org/wiki/Fundamental_interaction" \o "Fundamental interaction), [physical process](https://en.wikipedia.org/wiki/Physical_process" \o "Physical process) and [physical constant](https://en.wikipedia.org/wiki/Physical_constant" \o "Physical constant), and therefore all forms of [matter](https://en.wikipedia.org/wiki/Matter" \o "Matter) and [energy](https://en.wikipedia.org/wiki/Energy" \o "Energy), and the structures they form, from [sub-atomic particles](https://en.wikipedia.org/wiki/Sub-atomic_particles" \o "Sub-atomic particles) to entire [galactic filaments](https://en.wikipedia.org/wiki/Galaxy_filament" \o "Galaxy filament). Since the early 20th century, the field of [cosmology](https://en.wikipedia.org/wiki/Cosmology" \o "Cosmology) establishes that [space and time](https://en.wikipedia.org/wiki/Space_and_time" \o "Space and time) emerged together at the [Big Bang](https://en.wikipedia.org/wiki/Big_Bang" \o "Big Bang) 13.787±0.020 billion years ago[[11]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-12) and that the [universe has been expanding](https://en.wikipedia.org/wiki/Expansion_of_the_universe" \o "Expansion of the universe) since then. The [portion of the universe that we can see](https://en.wikipedia.org/wiki/Observable_universe" \o "Observable universe) is approximately 93 billion [light-years](https://en.wikipedia.org/wiki/Light-year" \o "Light-year) in diameter at present, but the total size of the universe is not known.[[3]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-Brian_Greene_2011-3)

Some of the earliest [cosmological models](https://en.wikipedia.org/wiki/Timeline_of_cosmological_theories" \o "Timeline of cosmological theories) of the universe were developed by [ancient Greek](https://en.wikipedia.org/wiki/Ancient_Greek_philosophy" \o "Ancient Greek philosophy) and [Indian philosophers](https://en.wikipedia.org/wiki/Indian_philosophy" \o "Indian philosophy) and were [geocentric](https://en.wikipedia.org/wiki/Geocentric_model" \o "Geocentric model), placing Earth at the center.[[12]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-13)[[13]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-Routledge-14) Over the centuries, more precise astronomical observations led [Nicolaus Copernicus](https://en.wikipedia.org/wiki/Nicolaus_Copernicus" \o "Nicolaus Copernicus) to develop the [heliocentric model](https://en.wikipedia.org/wiki/Heliocentrism" \o "Heliocentrism) with the [Sun](https://en.wikipedia.org/wiki/Sun" \o "Sun) at the center of the [Solar System](https://en.wikipedia.org/wiki/Solar_System" \o "Solar System). In developing the [law of universal gravitation](https://en.wikipedia.org/wiki/Newton's_law_of_universal_gravitation" \o "Newton's law of universal gravitation), [Isaac Newton](https://en.wikipedia.org/wiki/Isaac_Newton" \o "Isaac Newton) built upon Copernicus's work as well as [Johannes Kepler](https://en.wikipedia.org/wiki/Johannes_Kepler" \o "Johannes Kepler)'s [laws of planetary motion](https://en.wikipedia.org/wiki/Kepler's_laws_of_planetary_motion" \o "Kepler's laws of planetary motion) and observations by [Tycho Brahe](https://en.wikipedia.org/wiki/Tycho_Brahe" \o "Tycho Brahe).

Further observational improvements led to the realization that the Sun is one of a few hundred billion stars in the [Milky Way](https://en.wikipedia.org/wiki/Milky_Way" \o "Milky Way), which is one of a few hundred billion galaxies in the observable universe. Many of the stars in a galaxy [have planets](https://en.wikipedia.org/wiki/Exoplanet" \o "Exoplanet). [At the largest scale](https://en.wikipedia.org/wiki/End_of_Greatness" \o "End of Greatness), galaxies are distributed uniformly and the same in all directions, meaning that the universe has neither an edge nor a center. At smaller scales, galaxies are distributed in [clusters](https://en.wikipedia.org/wiki/Galaxy_cluster" \o "Galaxy cluster) and [superclusters](https://en.wikipedia.org/wiki/Supercluster" \o "Supercluster) which form immense [filaments](https://en.wikipedia.org/wiki/Galaxy_filament" \o "Galaxy filament) and [voids](https://en.wikipedia.org/wiki/Void_(astronomy)" \o "Void (astronomy)) in space, creating a vast foam-like structure.[[14]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-15) Discoveries in the early 20th century have suggested that the universe had a beginning and has been expanding since then.[[15]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-Hawking-16)

According to the Big Bang theory, the energy and matter initially present have become less dense as the universe expanded. After an initial accelerated expansion called the [inflationary epoch](https://en.wikipedia.org/wiki/Inflationary_epoch" \o "Inflationary epoch) at around 10−32 seconds, and the separation of the four known [fundamental forces](https://en.wikipedia.org/wiki/Fundamental_interaction" \o "Fundamental interaction), the universe gradually cooled and continued to expand, allowing the first [subatomic particles](https://en.wikipedia.org/wiki/Subatomic_particle" \o "Subatomic particle) and simple [atoms](https://en.wikipedia.org/wiki/Atom" \o "Atom) to form. Giant clouds of [hydrogen](https://en.wikipedia.org/wiki/Hydrogen" \o "Hydrogen) and [helium](https://en.wikipedia.org/wiki/Helium" \o "Helium) were gradually drawn to the places where matter was most [dense](https://en.wikipedia.org/wiki/Density" \o "Density), forming the first galaxies, stars, and everything else seen today.

From studying the effects of [gravity](https://en.wikipedia.org/wiki/Gravity" \o "Gravity) on both matter and light, it has been discovered that the universe contains much more [matter](https://en.wikipedia.org/wiki/Matter" \o "Matter) than is accounted for by visible objects; stars, galaxies, nebulas and interstellar gas. This unseen matter is known as [dark matter](https://en.wikipedia.org/wiki/Dark_matter" \o "Dark matter).[[16]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-17) In the widely accepted [ΛCDM](https://en.wikipedia.org/wiki/Lambda-CDM_model" \o "Lambda-CDM model) cosmological model, dark matter accounts for about 25.8%±1.1% of the mass and energy in the universe while about 69.2%±1.2% is [dark energy](https://en.wikipedia.org/wiki/Dark_energy" \o "Dark energy), a mysterious form of energy responsible for the [acceleration](https://en.wikipedia.org/wiki/Accelerated_expansion" \o "Accelerated expansion) of the [expansion of the universe](https://en.wikipedia.org/wiki/Expansion_of_the_universe" \o ").[[17]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-planck_2015-18) Ordinary ('[baryonic](https://en.wikipedia.org/wiki/Baryon" \l "Baryonic_matter" \o "Baryon)') matter therefore composes only 4.84%±0.1% of the universe.[[17]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-planck_2015-18) Stars, planets, and visible gas clouds only form about 6% of this ordinary matter.[[18]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-19)

There are many competing hypotheses about the [ultimate fate of the universe](https://en.wikipedia.org/wiki/Ultimate_fate_of_the_universe" \o "Ultimate fate of the universe) and about what, if anything, preceded the Big Bang, while other physicists and philosophers refuse to speculate, doubting that information about prior states will ever be accessible. Some physicists have suggested various [multiverse](https://en.wikipedia.org/wiki/Multiverse" \o "Multiverse) hypotheses, in which the universe might be one among many.[[3]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-Brian_Greene_2011-3)[[19]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-EllisKS032-20)[[20]](https://en.wikipedia.org/wiki/Universe" \l "cite_note-21)