



Solar System

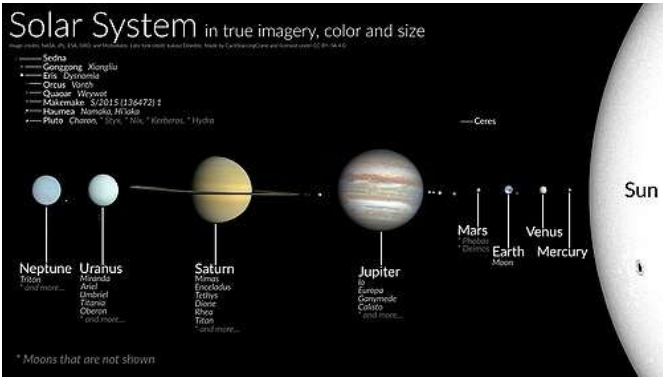
The **Solar System**,^[d] named after *Sōl*, the Latin name for the Sun, is the planetary system of the Sun and the celestial objects that orbit it.^[11] It formed about 4.6 billion years ago when a dense region of a molecular cloud collapsed, forming the Sun and a protoplanetary disc. The Sun is a typical star that maintains a balanced equilibrium by the fusion of hydrogen into helium at its core, releasing this energy from its outer photosphere. Astronomers classify it as a G-type main-sequence star.

The largest objects that orbit the Sun are the eight planets. In order of increasing distance from the Sun, there are four terrestrial planets — Mercury, Venus, Earth and Mars — two gas giants — Jupiter and Saturn — and finally two ice giants — Uranus and Neptune. All terrestrial planets have solid surfaces. Inversely giant planets are mainly composed of fluids and as such do not have a fixed surface. Over 99.86% of the Solar System's mass is located within the Sun, and nearly 90% of the rest forms Jupiter and Saturn.

There is a strong consensus among astronomers^[e] that the Solar System has at least nine dwarf planets: Ceres, Orcus, Pluto, Haumea, Quaoar, Makemake, Gonggong, Eris, and Sedna. There are a vast number of small Solar System bodies, such as asteroids, comets, centaurs, meteoroids, and interplanetary dust clouds. Some of these bodies are in the asteroid belt (between Mars's and Jupiter's orbit) and the Kuiper belt (just outside Neptune's orbit).^[f] Six planets, seven dwarf planets, and other bodies have orbiting natural satellites, which are commonly called 'moons'.

The Solar System is constantly flooded by outflowing charged particles from the solar wind, forming the heliosphere. At around 75–90

Solar System



The Sun, planets, moons and dwarf planets^[a] (true color, size to scale, distances not to scale)

Age	4.568 billion years ^[b]
Location	<u>Local Interstellar Cloud</u> <u>Local Bubble</u> ^[1] <u>Orion–Cygnus Arm</u> <u>Milky Way</u> ^[2]
Nearest star	<u>Proxima Centauri</u> (4.2465 ly) ^[D 1] <u>Alpha Centauri</u> (4.36 ly) ^[D 2]
Population	
Stars	<u>Sun</u>
Planets	<u>Mercury</u> <u>Venus</u> <u>Earth</u> <u>Mars</u> <u>Jupiter</u> <u>Saturn</u> <u>Uranus</u> <u>Neptune</u>

astronomical units from the Sun,^[g] the solar wind is halted, resulting in the heliopause. This is the boundary of the Solar System to interstellar space. The outermost region of the Solar System is the theorized Oort cloud, the source for long-period comets, extending to a radius of 2,000–200,000 AU. The closest star to the Solar System, Proxima Centauri, is 4.25 light-years (269,000 AU) away. Both stars belong to the Milky Way galaxy.

Formation and evolution

Past

The Solar System formed at least 4.568 billion years ago from the gravitational collapse of a region within a large molecular cloud.^[b] This initial cloud was likely several light-years across and probably birthed several stars.^[14] As is typical of molecular clouds, this one consisted mostly of hydrogen, with some helium, and small amounts of heavier elements fused by previous generations of stars.^[15]

As the pre-solar nebula^[15] collapsed, conservation of angular momentum caused it to rotate faster. The center, where most of the mass collected, became increasingly hotter than the surroundings.^[14] As the contracting nebula spun faster, it began to flatten into a protoplanetary disc with a diameter of roughly 200 AU^{[14][16]} and a hot, dense protostar at the center.^{[17][18]} The planets formed by accretion from this disc,^[19] in which dust and gas gravitationally attracted each other, coalescing to form ever larger bodies. Hundreds of protoplanets may have existed in the early Solar System, but they either merged or were destroyed or ejected, leaving the planets, dwarf planets, and leftover minor bodies.^{[20][21]}

Due to their higher boiling points, only metals and silicates could exist in solid form in the warm inner Solar System close to the Sun (within the frost line). They eventually formed the rocky planets of Mercury, Venus, Earth, and Mars. Because these refractory materials only comprised a small fraction of the solar nebula, the terrestrial planets could not grow very large.^[20]

<u>Known dwarf planets</u>	<u>Ceres</u> <u>Orcus</u> <u>Pluto</u> <u>Haumea</u> <u>Quaoar</u> <u>Makemake</u> <u>Gonggong</u> <u>Eris</u> <u>Sedna</u> <i>more candidates...</i>
<u>Known natural satellites</u>	758 ^[D 3]
<u>Known minor planets</u>	1,368,528 ^[D 4]
<u>Known comets</u>	4,591 ^[D 4]
Planetary system	
<u>Star spectral type</u>	<u>G2V</u>
<u>Frost line</u>	~5 AU ^[5]
<u>Semi-major axis of outermost planet</u>	30.07 AU ^[D 5] (<u>Neptune</u>)
<u>Kuiper cliff</u>	50–70 AU ^{[3][4]}
<u>Heliopause</u>	detected at 120 AU ^[6]
<u>Hill sphere</u>	1.1 pc (230,000 AU) ^[7] – 0.865 pc (178,419 AU) ^[8]
Orbit about <u>Galactic Center</u>	
<u>Invariable-to-galactic plane inclination</u>	~60°, to the ecliptic ^[c]
<u>Distance to Galactic Center</u>	24,000–28,000 ly ^[9]
<u>Orbital speed</u>	720,000 km/h (450,000 mi/h) ^[10]
<u>Orbital period</u>	~230 <u>million years</u> ^[10]