

Chronology of the formation and evolution of the Solar System

Phase | Time since formation of the Sun | Time from present (approximate) | Event:

Pre-Solar System :

Billions of years before the formation of the Solar System Over 4.6 billion years ago (bya) Previous generations of stars live and die, injecting heavy elements into the interstellar medium out of which the Solar System formed.[14]

~ 50 million years before formation of the Solar System 4.6 bya If the Solar System formed in an Orion nebula-like star-forming region, the most massive stars are formed, live their lives, die, and explode in supernovae. One particular supernova, called the primal supernova, possibly triggers the formation of the Solar System.[16][17]

Formation of Sun :

0-100,000 years 4.6 bya Pre-solar nebula forms and begins to collapse. Sun begins to form.[29]

100,000 - 50 million years 4.6 bya Sun is a T Tauri protostar.[9]

100,000 - 10 million years 4.6 bya Outer planets form. By 10 million years, gas in the protoplanetary disc has been blown away, and outer planet formation is likely complete.[29]

10 million - 100 million years 4.5-4.6 bya Terrestrial planets and the Moon form. Giant impacts occur. Water delivered to Earth.[2]

Main sequence :

50 million years 4.5 bya Sun becomes a main sequence star.[25]

200 million years 4.4 bya Oldest known rocks on the Earth formed.[114]

500 million - 600 million years 4.0-4.1 bya Resonance in Jupiter and Saturn's orbits moves Neptune out into the Kuiper belt. Late Heavy Bombardment occurs in the inner Solar System.[2]

800 million years 3.4 bya Oldest known life on Earth.[59] Oort cloud reaches maximum mass.[62]

4.6 billion years Today Sun remains a main sequence star, continually growing warmer and brighter by ~10% every 1 billion years.[92]

6 billion years 1.4 billion years in the future Sun's habitable zone moves outside of the Earth's orbit, possibly shifting onto Mars's orbit.[95]

7 billion years 2.4 billion years in the future The Milky Way and Andromeda Galaxy begin to collide. Slight chance the Solar System could be captured by Andromeda before the two galaxies fuse completely.[111]

Post-main sequence :

10 billion - 12 billion years 5-7 billion years in the future Sun starts burning hydrogen in a shell surrounding its core, ending its main sequence life. Sun begins to ascend the red giant branch of the Hertzsprung-Russell diagram, growing dramatically more luminous (by a factor of up to 2,700), larger (by a factor of up to 250 in radius), and cooler (down to 2600 K): Sun is now a red giant. Mercury and possibly Venus and Earth are swallowed.[93][98] Saturn's moon Titan may become habitable.[100]

~ 12 billion years ~ 7 billion years in the future Sun passes through helium-burning horizontal branch and asymptotic giant branch phases, losing a total of ~30% of its mass in all post-main sequence phases. Asymptotic giant branch phase ends with the ejection of a planetary nebula, leaving the core of the Sun behind as a white dwarf.[93][103]

Remnant Sun :

> 12 billion years > 7 billion years in the future The white dwarf Sun, no longer producing energy, begins to cool and dim continuously; this continues for trillions of years, eventually reaching a black dwarf state.[105][107]

~ 1 quadrillion years (10¹⁵ years) ~ 1 quadrillion years in the future Sun cools to 5 K.[116] Gravity of passing stars detaches planets from orbits. Solar System ceases to exist.[3]

Source: Wikipedia

