

Natural Satellites and Quasi-satellites

Natural Satellites



Picture: Mars moon Phobos, Mars Reconnaissance Orbiter (2008) took this colour photo

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[https://en.wikipedia.org/wiki/Phobos_\(moon\)#/media/File:Phobos_colour_2008.jpg](https://en.wikipedia.org/wiki/Phobos_(moon)#/media/File:Phobos_colour_2008.jpg)

Moons are relatively common in the solar system. While planets move around stars, moons are natural companions of the planets and are under their gravitational influence. They move on Keplerian orbits around the planets and together with their planet around their respective star. However, moons can also move around other objects, such as dwarf planets and asteroids. Recent observational results show that even Trojans can have moons. Moons vary greatly in size and shapes. The largest moons form almost a sphere, while smaller ones can be very jagged or fragmentary in shape. The range of diameters of the moons is from a few thousand kilometres down to half a kilometre. There are a large number of smaller moons. An exact size limit for the name moon has not been assigned by astronomers so far. Theoretically, all small objects from Saturn's ring could be called moons. The moons consist mainly of rock and ice. The diversity of the moons is also expressed in their peculiarities regarding their activities and properties.

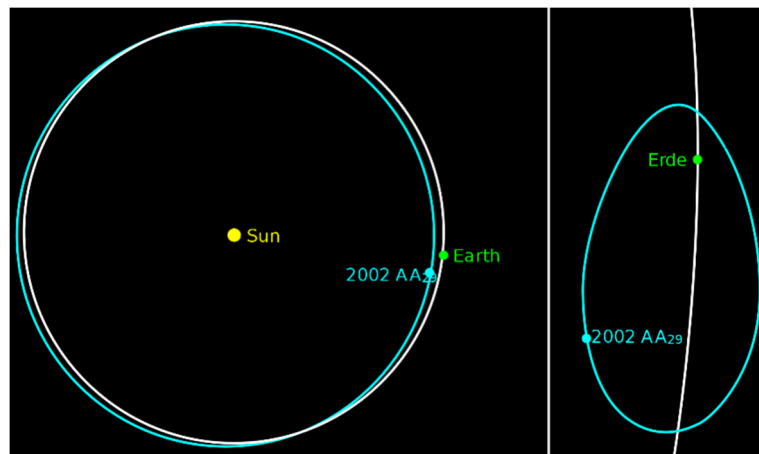
- The largest moon in the solar system, Ganymede, is larger than the smallest planet, Mercury.
- The so-called shepherd moons, which are responsible for the cohesion of Saturn's rings, are singled out from the many individual objects of the rings and are called moons.
- Saturn's moon Titan, as the second largest moon in the solar system, is the only moon with a proper atmosphere. There are methane lakes, methane rivers and methane rain.
- Io as the innermost of the four Galilean Jupiter moons is the most volcanic moon in the solar system.
- Jupiter's moon Europa and Saturn's moon Enceladus are thought to have vast saltwater oceans beneath their thick ice shells. These oceans would be a precondition that life could have developed on these moons.

- The dwarf planet Pluto and its largest moon, Charon, have only a relatively small difference in size, so that the gravitational equilibrium is not in Pluto, as is usually the case with planets, but between the two objects.

Link: https://en.wikipedia.org/wiki/Natural_satellite

Link: https://en.wikipedia.org/wiki/List_of_natural_satellites

Quasi-satellites



Picture: Quasi-satelliten orbit of the asteroid 2002 AA29 at the year 2589 from the view perpendicular to the ecliptic. The left side shows the orbits of 2002 AA29 and the earth from the resting reference frame, the right side shows the same orbit of 2002 AA29 from the reference frame which moves with the orbital motion of the earth.

Autor: JPL/NEO, Daniel Arnold (JPG/PNG versions), Michał Połtyn (SVG versions)

<https://de.wikipedia.org/wiki/Quasisatellit#/media/Datei:2002aa29-orbit-4.svg>

A quasi-satellite is a small companion of a planet. It moves in a very similar Keplerian orbit to that of the planet around the Sun. The orbital period and the orbital inclination of these quasi-satellites are almost identical to those of their planets. Mostly these companions are asteroids, which with their stay inside and outside the planet's orbit act as if they orbit the planet. However, their orbit is almost completely under the influence of the Sun. This clearly distinguishes them from the moons. The orbits of the planet and the quasi-satellite can be compared to the travel of two cars on the highway. Both cars travel at approximate speeds and overtake each other, changing lanes each time.

Due to the influence of the gravitational effect of their planets on the orbits of the quasi-satellites, their orbit does not remain stable. They can then turn into real moons or even leave their planet. Quasi-satellites of Neptune and Uranus have very stable orbits, which can last for several billions of years, whereas the orbits of Saturn only last for a few hundred thousand years. Almost every planet has such quasi-satellites, including Earth. The small quasi-satellite 2003YN107 could be captured by the Earth during its next very close approach in 2120 and then become its second moon.

Link: <https://en.wikipedia.org/wiki/Quasi-satellite>