

# Comets

Comets: Name from the Greek "hair star"

Diameter: several kilometres to approx. 100 kilometres  
(irregular shape)

Components: frozen water and stones ("dirty  
snowball")

Proximity to the sun: formation of a tail (hence also tail  
star)

Tail length: up to several 100 million kilometres - here:  
several 100 m

Aperiodic comets: non-recurring comets

Periodic comets: Comets that recur regularly (e.g.  
Halley's Comet)

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# Comets



Picture (Comet Tschurjumow-Gerassimenko)

Author: Justin Cowart

[https://en.wikipedia.org/wiki/Comet#/media/File:67P\\_Churyumov-Gerasimenko\\_-\\_Rosetta\\_\(32755885495\).png](https://en.wikipedia.org/wiki/Comet#/media/File:67P_Churyumov-Gerasimenko_-_Rosetta_(32755885495).png)



Picture: (Comet Hale-Bopp):

Author: Philipp Salzgeber

[https://en.wikipedia.org/wiki/Comet#/media/File:Comet-Hale-Bopp-29-03-1997\\_hires\\_adj.jpg](https://en.wikipedia.org/wiki/Comet#/media/File:Comet-Hale-Bopp-29-03-1997_hires_adj.jpg)

Comets (name from the Greek: hair stars) belong to the smaller bodies of the solar system. Due to their special structure, however, they are classified in a separate group. Comets, also called tail stars, usually have a diameter of a few tens of kilometers, but can also reach sizes of up to 100 km. They usually have a very eccentric orbit, i.e. the orbit is a very pronounced ellipse. It can also degenerate into a parabola or hyperbola. These orbits indicate that the

comet will leave our solar system or is a visitor from the galaxy. During their orbits, comets approach the Sun and then acquire their characteristic tail. By the proximity to the sun the comet heats up, whereby gases escape and/or materials become gaseous. These gases are then made to glow by the solar wind through ionization. One distinguishes two types:

- Aperiodic comets: Comets that do not recur due to their parabolic or hyperbolic orbit.
- Periodic comets: Comets that recur regularly. They have an elliptical relatively stable orbit around the Sun (e.g. Halley's Comet).

Long-period comets (orbital period of more than 200 years) probably come from the Oort cloud. As a result of gravitational perturbations by other stars, these comets are placed in close orbits around the Sun. They orbit the sun either in the same sense as the planets (prograde) or in the opposite sense (retrograde). Their orbital periods can be as long as millions of years. They can also leave the solar system by passing Jupiter (swing-by maneuverer).

Short-period comets (orbital periods less than 200 years) probably originate from the Kuiper belt (relatively flat region outside the orbit of Neptune at a distance of about 30 to 50 AU from the Sun). Their orbits are modified by gravitational perturbations of the major planets. They mostly move in the prograde orbital sense (example: comet Hyakutake with the designation C/1996 B2).

Newly discovered comets are first given only a nomenclature consisting of the year of discovery, the semi-monthly discovery period (A to Jan. 16, B to Jan. 31, etc. to Y from Dec. 16 - I is omitted), and a number indicating the order of discovery. In addition, a letter is prefixed according to the orbit:

- P: the orbit period is smaller than 200 years.
- C: the orbit period is bigger than 200 years.
- X: the orbit cannot be determined.
- D: Periodic Comet, that has been lost or no longer exists..
- A: It has not been a comet, but an asteroid.

A comet consists mainly of a nucleus, which is a conglomerate of ice and solids (water, dry (CO<sub>2</sub>), carbon monoxide, methane and ammonia ice, and mineral particles, such as silicates, nickel iron). Therefore, a comet is also called a dirty snowball.

When the comet approaches the sun (approximately from the orbit of Jupiter), a bowl-shaped coma forms. It is formed by outgassing of volatile substances and entrainment of dust particles on the side facing the sun. The coma can reach an extension of 2 to 3 mill. km.

The components of the coma are ionized and blown away by the solar wind and the radiation pressure of the sun, so that from the coma a tail develops, which can be several 100 mill. km long. By this tail comets can be recognized very well in the sky. Because of the tail, the comet continues to lose mass with each new approach to the sun until one day it breaks apart and ends its existence.

The hypothetical Oort cloud could not be proven so far. It is supposed to be about 100,000 astronomical units (1 AU 150 mill. km) away from the sun and to form a shell around the solar system. It is said to contain a large number of objects, some of which are ejected from their orbits by stellar approaches into the interior of the solar system and then appear as long-period comets.

Link: <https://en.wikipedia.org/wiki/Comet>

Link: [https://en.wikipedia.org/wiki/Lists\\_of\\_comets](https://en.wikipedia.org/wiki/Lists_of_comets)

Link: [https://en.wikipedia.org/wiki/Oort\\_cloud](https://en.wikipedia.org/wiki/Oort_cloud)