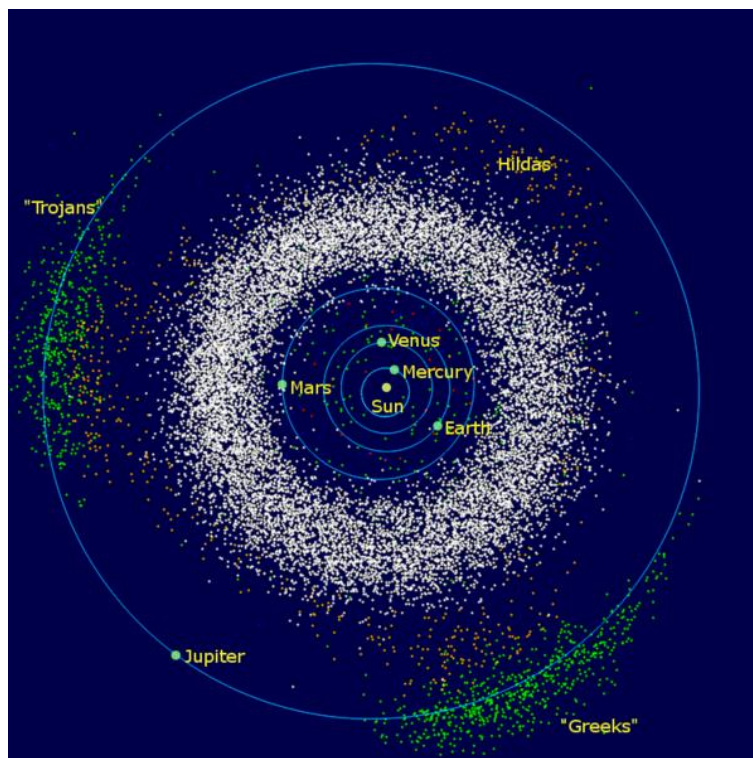


Trojans

- Trojans are asteroids with special orbits.
- They orbit one of the two so-called Lagrange points L4 and L5.
- These two Lagrange points are located 60° before (L4) and 60° after (L5) the planet on the same orbit of the respective planet around the sun.
- The Lagrange points are massless.
- Jupiter has a pronounced structure of Trojans.

Sponsored by: Pascal Liebig, Müllrose

Trojans



Picture: Representation of the inner solar system. The Trojan asteroids of Jupiter ("Greeks" and "Trojans") are marked in green.

Author: Mdf at English Wikipedia

[https://en.wikipedia.org/wiki/Trojan_\(celestial_body\)#/media/File:InnerSolarSystem-en.png](https://en.wikipedia.org/wiki/Trojan_(celestial_body)#/media/File:InnerSolarSystem-en.png)

Trojans, also called coorbital objects, are a special class of asteroids and belong to the small planets. In their structure and chemical composition, they resemble the other asteroids. The peculiarity of this class of asteroids lies in their orbital data, which consist of several components:

- They move in Keplerian orbits around the sun.
- They are all fixed to the orbit of their associated planet.
- They orbit one of the two so-called Lagrange points L4 and L5.

The two Lagrange points L4 and L5, also called libration points, are each 60° before (L4) or 60° after the planet (L5) on the same orbit as the respective planet. At the Lagrange points, there are equilibria of forces between the Sun and the planet, so that a smaller body can orbit the Sun stably at these points. It is on the same orbit as the planet, but it does not orbit the planet. There are five Lagrange points (see figure). Since the general three-body problem can be solved approximately numerically under the condition that the mass of the Trojan is negligible compared to the masses of the sun and the planet, analytical solutions for the respective geometric arrangement can also be found in celestial mechanics. Trojans orbit the libration points L4 and L5 because these orbits are stable without propulsion. In space travel, however, the libration points L1 and L2 of the Earth are used (e.g. currently by the James Webb telescope).

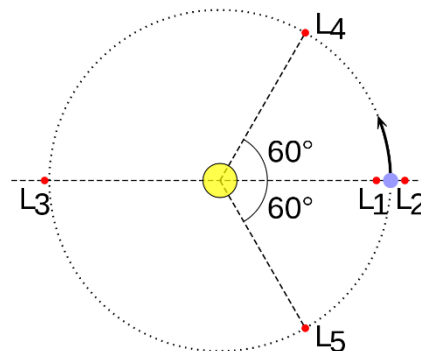


Bild: Lagrange points L1 to L5 in a system of central star (yellow) and planet (blue): L4 is running ahead of the planet, L5 behind.

[https://en.wikipedia.org/wiki/Trojan_\(celestial_body\)#/media/File:Lagrange_very_massive.svg](https://en.wikipedia.org/wiki/Trojan_(celestial_body)#/media/File:Lagrange_very_massive.svg)

Author: EnEdC

The first Trojans were discovered on Jupiter. Jupiter has two groups of Trojans, the Greek fraction ("Greeks") rushes ahead of Jupiter (point L4) and the Trojan fraction ("Trojans") rushes behind Jupiter (point L5). The names for these objects come mainly from the Homeric works and, with a few exceptions, are assigned according to the following scheme: Greek names belong to the L4 objects and Trojan names to the L5 objects. The Jupiter group of Trojans is also by far the largest group of Trojans in terms of numbers, with more than 2,000 objects.

With current observation methods, also Trojans were discovered at other planets:

- Venus: So far, one Trojan is known, but it will leave its Trojan orbit in about 500 years.
- Earth: Two real Trojans have been identified here so far.

- Mars: Eight Trojans have been discovered so far, with seven stationed at point L5 and one at point L4.
- Uranus: One Trojan has been detected here so far at point L4.
- Neptune: Nine Trojans have been detected so far. They shall receive names of Amazons.
- Saturn: Saturn itself has no Trojans. But, the two moons Tethys and Dione have Trojan moons as companions. In the orbits of both moons, there is a small moon at the L4 and L5 points in the same orbit as the moons themselves.
- Jupiter: First moons were discovered at the Jupiter Trojans. These moons move on circular orbits around the common centre of gravity of the Trojan-Trojan moon system.

Link: [https://en.wikipedia.org/wiki/Trojan_\(celestial_body\)](https://en.wikipedia.org/wiki/Trojan_(celestial_body))

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

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

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

Link: https://en.wikipedia.org/wiki/Horseshoe_orbit#Tadpole_orbit