

A Brief Column for the Beginning Stargazer Introducing a New Astronomical Term Each Month

Astronomy is rich with terminology. This column will help beginning stargazers ease into the world of astronomy by *briefly introducing* a new but *basic astronomical term* (word, acronym or abbreviation) each month. This list, which began January 1999 with the letter *a*, is alphabetical but uses successive letters for each month's entry. (We will return to the letter *a* after twenty-six months.)

(The February 2001 column ended with *z* so we are now in the second cycle of twenty-six terms. See the February 2001 issue for a cumulative index.)

Word of the Month for May 2001

Charon (KAIR en or SHAHR en) The only known satellite of the most distant known planet Pluto. Charon is somewhat smaller than the Moon with a diameter about one third as large as Earth's satellite. At *mean opposition*, Charon's magnitude is only +17.

However, Charon is the largest satellite in the solar system *compared with its planet*. Charon's diameter is just over half of Pluto's diameter. Also Charon's mass is more than one tenth of that of Pluto's mass. So, this actually makes Pluto and Charon a **"double planet."**

Only one other planet in the solar system is similar to the Pluto-Charon system—the Earth-Moon system, where the Moon is one quarter the diameter of the Earth. All other planetary satellites have satellite-planet diameter ratios much smaller (1/18 or less).

James Walter Christy discovered Charon in 1978 at the Naval Observatory from a slight elongation or "bump" in a photograph of Pluto. Charon is named for the mythical ferryman who conveyed the dead to Hades over the river Styx. (Pluto was the Roman god of the dead and ruler of the underworld.) Charon's name also honors Christy's wife, Charlene, so some pronounce the first syllable sounding like "shard."

Charon's mean distance from Pluto is only 19,640 kilometers (12,200 miles), or only one twentieth the distance of the Moon from Earth. Charon also takes only 6.39 days to orbit Pluto rather than 27.32 days required for the Moon to orbit Earth. In fact, both

Charon and Pluto seem to rotate *synchronously* with their orbit period. That is, each object rotates once on its axis in the same time as the 6.39 day orbit period. This not only causes Pluto and Charon to keep the same face toward the other but also causes each to remain stationary over one point on their surfaces.

(The Moon's rotation period is also synchronous with its orbit period around Earth so the Moon keeps the same face toward Earth. However, Earth's rotation is not synchronous.)

Charon's orbit about Pluto is nearly circular and close to the equatorial plane of Pluto. But the rotation axes of these objects are inclined by nearly 120° to their orbit plane. This makes their rotation directions appear *retrograde* or backwards when viewed down from the north side of their orbit. (The only other planets that have retrograde rotation are Venus and Uranus.)

The discovery of Charon has tremendously advanced our knowledge of distant Pluto. Using orbit characteristics of the Pluto-Charon system and light variations from a series of mutual eclipses (from 1985 to 1991), astronomers were only recently able to compute their masses, radii and mean densities though Charon's values are still poorly known.

Both Charon and Pluto have low mean densities, about twice that of water. (The Earth's and Moon's mean densities are 5.5 and 3.3 times water respectively.) These low mean densities are typical of outer solar system objects (from Jupiter and beyond). Such low densities suggest both Charon and Pluto are primarily water ice but with substantial, rocky cores. Spectra of Charon suggest the presence of water ice but not methane, a gas detected on Pluto.

Pluto-Charon is the only planetary system never visited by a spacecraft from Earth. A NASA proposed Pluto mission, the Pluto/Kuiper Express (PKE), is currently uncertain because Bush's 2002 budget proposal excludes PKE funds. NASA wants a 2004 launch date to utilize a Jupiter gravity assist opportunity. Delay may mean no mission for a generation. ✧

References. J. Mitton 1991, *Concise Dictionary of Astronomy* (Oxford Univ. Press); I. Ridpath 1997, *A Dictionary of Astronomy* (Oxford Univ. Press).