

# "The chaotic rotation of Pluto's small moons explained"

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In June 2015, the Nature journal has announced that the four small moons of Pluto have a chaotic rotation. A research led by scientists Mark Showalter (SETI Institute) and Doug Hamilton (University of Maryland) showed that the rotation of moons Nix, Hydra, Kerberos and Styx, unlike what happens to the moons of most planets that were already known, is not synchronous with the orbital mean motion, and varies unforeseeably over time.

The University of Aveiro researchers have explained the reason for the strange rotation of Pluto's four moons by applying the laws of gravity. In order to understand this problem it is necessary to consider two factors that distinguish these four moons from all others, namely from Charon, the other moon of Pluto that has a regular synchronous rotation:

1) the four moons in question are small-sized bodies less than 50 km across, they look more like potato-shaped asteroids than spherical bodies like the Moon and the Earth. They have therefore one axis longer than the others.

2) unlike the four small moons, Pluto's biggest moon, Charon, is almost as big as Pluto. Therefore, technically, the Pluto-Charon system must be classified as a binary system and not as a planet-moon system.

As a consequence, the small moons attempt to point the long axis not only to Pluto, but also to Charon. Since this is not possible, the gravitational perturbations from the inner system on the long axis constantly destabilise the rotation of the small moons, preventing them from achieving the synchronous state. More details can be found in the journal *Astronomy & Astrophysics Letters*.

