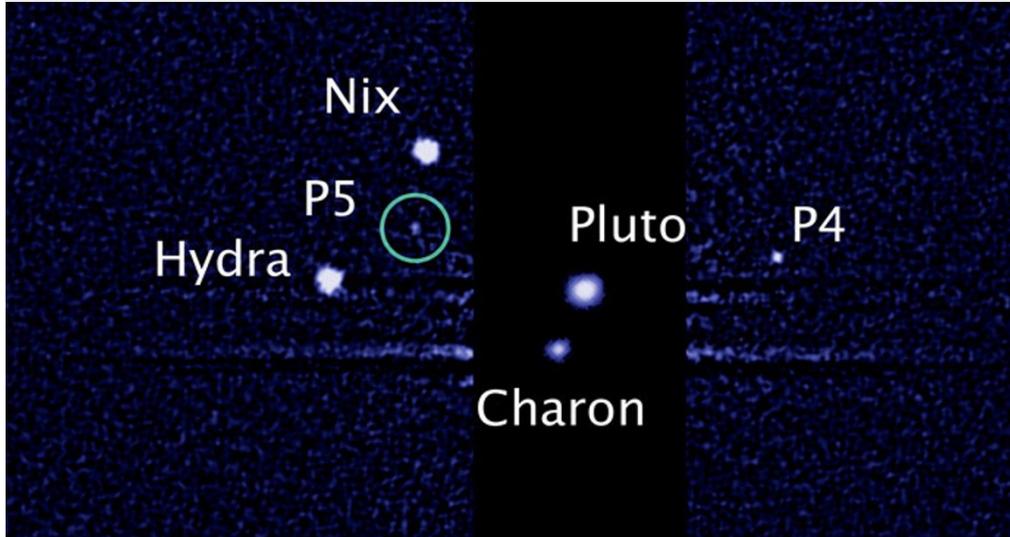


Hubble telescope spots a 5th Plutonian satellite

The newfound moon and its kin may be remnants of an ancient smashup.

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NASA/ESA/M. Showalter/SETI Institute

Pluto now has five known satellites: Charon, Hydra, Nix, P4 and P5.

An article from *Scientific American*.

As humankind's first robotic visitor to Pluto approaches its destination, astronomers working to understand what it will find there have uncovered a tiny moon orbiting the dwarf planet.

The moon is the fifth known natural satellite of Pluto and has been informally labeled P5. It was discovered Saturday, July 7, in images taken by the Hubble Space Telescope as part of a campaign to identify possible hazards to the New Horizons spacecraft, now en route to Pluto for a 2015 flyby. Dust rings encircling Pluto, or small moons shedding unseen debris, could endanger the \$700-million mission. So far, the search has not identified any dangerous dust bands around Pluto, but it has turned up two newfound moons—a small object called P4 last year, and now P5.

P5 is incredibly faint—half as bright as P4, and roughly one one-hundred-thousandth as bright as Pluto—and orbits relatively close to the dwarf planet. The newfound moon's faintness implies that it has a diameter of just 10 to 25 kilometers. "They're very close, and this is a very small object," says Mark Showalter, a planetary astronomer at the SETI Institute in Mountain View, Calif., who led the campaign. "So that's what Hubble can do."

P4 and P5 join Charon, a large moon of Pluto whose discovery was announced exactly 34 years prior to the day Showalter spotted P5 in new Hubble imagery as well as the small moons Nix and Hydra, discovered by astronomers using Hubble in 2005. All of those satellites could be remnants of one giant collision early in solar system history.

A plausible explanation for the myriad Plutonian moons, Showalter says, is that "this system began when something big hit Pluto billions of years ago—it created this big cloud of debris, most of which condensed to form Charon." Some of the cast-off material, though, settled into stable orbits farther from Pluto and coalesced into smaller moons. "Essentially we're just seeing the leftover debris," Showalter says.

All of the moons discovered so far appear linked to the motion of the much more massive Charon: their orbits all follow certain resonances with the orbit of the larger satellite. Nix is in what is called a one-to-four resonance with Charon—it orbits Pluto once for every four orbits of Charon—whereas P4 is in a one-to-five resonance and Hydra is in a one-to-six resonance. The newly discovered P5 appears to have fallen into resonance with Charon as well. "This object seems pretty close, as best we can tell, to the one-to-three

resonance," Showalter says. "These matches are not completely exact, but it's sure telling us something. These things just don't happen by accident."

"We think that the mean motion resonances are acting like a rut, collecting debris from the accretion epoch of Charon," says New Horizons principal investigator Alan Stern of the Southwest Research Institute in Boulder, Colo., who also contributed to the new research.

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The next logical place to look for additional moons would be in the unaccounted-for Charon resonances of one-to-two and one-to-seven. But the shorter the orbit, the closer to Pluto the moon would have to be, so a moon in a one-to-two resonance with Charon might be very difficult to spot next to the much larger, and much brighter dwarf planet.

"I think there's a very good chance" that more Plutonian satellites await discovery, Stern says. "Every time we look we see more. I expect New Horizons will see more that Hubble cannot see."

The possibility of discovering more moons is part of the reason that the astronomers have not proposed a formal name for P4, let alone P5. "The reason that P4 doesn't have a name yet is we've been tracking possible P5s," Showalter says, adding that none had panned out before Saturday. "If you have two moons to name then it becomes kind of a different process than naming one."

By convention, the moons' names come out of Greek mythology, in this case from stories related to Pluto, the god of the underworld. But the specific choice of myth depends on how many names are needed—if P4 and P5 prove to be the last of the tiny, faint moons to be discovered, then a two-character tale will suffice. "For example, there's the story of Orpheus, the only mortal to go into the underworld and return to save his wife, Eurydice," Showalter says. "Maybe a good name for them would be Orpheus and Eurydice." But if astronomers discover another moon circling Pluto, it's a different story—and a different myth—altogether.

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