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space: Pluto has big shiny colleague

JONATHAN TROUT

Astronomers in Hawaii have measured the size and shininess of Varuna, an object in the Kuiper belt, the ancient ring of icy bodies orbiting the Sun beyond Neptune, home also to Pluto and its satellite, Charon[1]. They are interested in the belt's composition, as it may have remained more or less unchanged since the birth of the Solar System.

The James Clerk Maxwell Telescope picked up Varuna's faint image.

Being cold, slow-moving and almost black, Kuiper-belt objects (KBOs) are very hard to see. David Jewitt of the Institute for Astronomy, Honolulu, and his colleagues used the James Clerk Maxwell Telescope - the largest astronomical telescope in the world - to pick up Varuna's faint thermal image.

They compared this image with simultaneous optical images from the University of Hawaii's telescope to determine how much of the object's brightness is due to its reflectance, and how much to its large diameter.

The measurement of the thermal emission of such cold objects has proved difficult because their emissions are absorbed in the Earth's atmosphere. Thanks partly to the fact that the James Clerk Maxwell Telescope is more than 4 km above sea level, the researchers could view Varuna through 'windows' in the far infrared.

They found that Varuna reflects around 7% of the sunlight that hits it. This figure for Varuna's albedo - the percentage of sunlight it reflects - is greater than researchers had assumed and more than that of most other asteroids for which accurate measurements are available.

"The higher-than-guessed albedo may be due to the presence of some ice on the surface, but nothing like as much as Pluto can command," speculates Brian G. Marsden of the Harvard Smithsonian Observatory.

Also known as the trans-neptunian belt, the Kuiper belt consists of more than 70,000 objects, the largest and best known of which is the planet Pluto. Pluto has long been visible owing to of its high albedo: because of its frost covering and thin atmosphere it reflects around 60% of the sunlight that hits it.

Varuna has a diameter of 900 km, Jewitt's team also calculates. This makes it the third largest known KBO, after Pluto (2,200 km) and Charon (1,200 km).

Steve Tegler of Northern Arizona University sees this as significant: "Varuna closes the gap between the largest previously known Kuiper-belt object (around 600 km in diameter) and Pluto. Pluto and Charon are not so unique in size now. Perhaps more Pluto-sized objects or even larger objects remain undiscovered in the outer reaches of the Solar System."

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1. Jewitt, D., Aussel, H. & Evans, A. The size and albedo of the Kuiper-belt object (20000) Varuna. *Nature* **411,** 446-447 (2001).

Web Links;

Kuiper Belt Homepage
James Clark Maxwell Telescope