

GEOMETRIC ALBEDO, SIZE AND PROJECTED SHAPE OF THE HAUMEA CLUSTER MEMBER (24835) 1995 SM55 FROM A STELLAR OCCULTATION AND PHOTOMETRIC OBSERVATIONS

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Trans-Neptunian objects (TNOs) are some of the most ancient and primitive bodies in the solar system, providing valuable insights into its formation and evolution. One effective method for studying these distant objects is through stellar occultations, which allows for precise measurements of their physical properties.

1995 SM55 is a notable member of the Haumea orbital cluster, making it an important target for observation. A predicted stellar occultation by this TNO took place on February 25, 2024, and was successfully detected from seven different instruments across five observatories, while 33 other sites reported non-detections. By analyzing the occultation data, we determined the object's projected shape, fitting it to an ellipse with semi-axes of approximately 109 ± 10 km and 90 ± 10 km, resulting in an area-equivalent diameter of 198 ± 20 km. This measurement is smaller than the upper limit of 250 km previously estimated from Herschel Observatory thermal data.

Photometric observations provided additional insights, including an absolute magnitude of 4.58 and a phase slope parameter of 0.015 mag/deg. The object's light curve showed a peak-to-valley variability of 0.08 mag, but no definitive rotational period could be established. Combining these results, we calculated a geometric albedo of 0.67 ± 0.12 in the V band, which is exceptionally high for a TNO. This value is slightly higher than that of Haumea but remains consistent with 1995 SM55's classification as part of the Haumea orbital cluster. The only other member of the Haumea cluster with geometric albedo determined through occultation also has a somewhat higher albedo than that of Haumea, which may indicate systematic differences in the surfaces of the cluster members compared to Haumea. These findings contribute to a better understanding of the physical characteristics of this unique group of TNOs.

Keywords: *Trans-Neptunian Objects, Small solar system bodies, dwarf planets, stellar occultations, photometry.*

